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# Form SF298 Citation Data

<b>Report Date</b> ("DD MON YYYY") 00062000	<b>Report Type</b> N/A	<b>Dates Covered (from... to)</b> ("DD MON YYYY")
<b>Title and Subtitle</b> Making Room for Space in Aerospace		<b>Contract or Grant Number</b>  <b>Program Element Number</b>
<b>Authors</b> Blaettler, Daniel C.		<b>Project Number</b>  <b>Task Number</b>  <b>Work Unit Number</b>
<b>Performing Organization Name(s) and Address(es)</b> School of Advanced Airpower Studies Air University Maxwell AFB, AL 36112		<b>Performing Organization Number(s)</b>
<b>Sponsoring/Monitoring Agency Name(s) and Address(es)</b>		<b>Monitoring Agency Acronym</b>  <b>Monitoring Agency Report Number(s)</b>
<b>Distribution/Availability Statement</b> Approved for public release, distribution unlimited		
<b>Supplementary Notes</b>		
<b>Abstract</b>		
<b>Subject Terms</b>		
<b>Document Classification</b> unclassified		<b>Classification of SF298</b> unclassified
<b>Classification of Abstract</b> unclassified		<b>Limitation of Abstract</b> unlimited
<b>Number of Pages</b> 94		

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# MAKING ROOM FOR SPACE IN AEROSPACE

BY

DANIEL C. BLAETTLER

A THESIS PRESENTED TO THE FACULTY OF  
THE SCHOOL OF ADVANCED AIRPOWER STUDIES  
FOR COMPLETION OF GRADUATION REQUIREMENTS

SCHOOL OF ADVANCED AIRPOWER STUDIES

AIR UNIVERSITY

MAXWELL AIR FORCE BASE, ALABAMA

JUNE 2000

## **Disclaimer**

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, the Department of Defense, the United States Air Force, or Air University.

### ***About the Author***

Lt Col Daniel C. Blaettler is a 1984 graduate of the United States Air Force Academy. He earned a Masters Degree in Business Administration from New Mexico Highlands University in 1987. He is a career acquisition officer with experience at the laboratory, major program office, and Air Staff levels. In addition to acquisition, Lt Col Blaettler has served as a squadron section commander and in joint assignments with the National Reconnaissance Office and United States Space Command. He and his wife Robin have been married since 1985. They have four children: Jacob, Sean, Jessica, and Shannon.

## ***Acknowledgments***

I know of few people who find doing research enjoyable. I am one of many who find the process extremely painful. I do, however, enjoy debating the merits of merging air and space into an aerospace concept with those who have opinions about such things (and even with those who don't). Because I am not alone in this debate, the numbers of people who assisted me in gathering information for this paper were many. Unfortunately, those who assisted have only me to blame for the final product that could only marginally exploit the myriad of ideas that we shared. I do want to thank them, however, for their efforts to help me think comprehensively about the ideas included in this paper.

First, Dr. Dana Johnson of RAND, though she may not fully realize it, was instrumental in setting me on the right track. Her previously published and unpublished papers on similar topics gave me the courage to pursue this paper in the first place. Next, Lt Col Peter Hays, my research advisor, and Lt Col Forrest Morgan, my reader, made great improvements to my very rough first draft, and made the final product presentable. I also must thank Lt Col Bret Smith of Air Force Space Command and Major "Bull" Doryland for their rapid assistance at the zero-hour to pull together much of the data supporting many of my conclusions. Finally, I wish to thank my family especially my wife Robin for not giving me too hard of a time when I had to "work on my paper" instead of assist with the family responsibilities. I promise to make it up to you.

## ***Abstract***

Is the Air Force on an evolutionary path to becoming a space and air force? Is it on an evolutionary path to becoming an aerospace force? What is an evolutionary path? Lacking a consistent and coherent vision of what it wants to be, can the Air Force evolve at all? This paper attempts to address the answers to these questions by analyzing the roots of the term aerospace and the controversy associated with its renewed use. It makes the assumption up front that the Air Force has abandoned the idea of establishing a “space and air” force. Instead, the Air Force is pursuing a new vision – the vision of an aerospace force.

The paper uses naval aviation, Marine amphibious warfare, and the Independent Air Force as examples of successful military evolution to establish indicators of evolutionary progress. Developed by Stephen Rosen in his book, *Winning the Next War*, these indicators include an enduring organizational vision and external support for the vision. Additional indicators include organizational and promotion pathway changes that recognize key leaders within the evolved organization. These indicators will be used to measure the Air Force’s current progress toward pursuing its vision of an aerospace concept. Ultimately the paper concludes the following:

1. Without a commonly agreed to definition of the term aerospace, the Air Force will not be successful in remaking itself as an aerospace force.
2. Any description of an aerospace force developed by the Air Force must be supported externally by the Department of Defense and Congress

and would benefit from support of the other services and space enthusiasts within the Air Force.

3. In its pursuit of the aerospace concept, the Air Force continues to regard space as support. Until space has a credible warfighting mission, it will continue to be regarded as a support function and continue to lack credibility in the “combat” community.
4. The target vision for the Air Force, if it truly wants to develop a space culture, is to establish a warfighting vision for space. The aerospace concept neglects the potential decisiveness of space power envisioned by space enthusiasts. The Air Force therefore needs a workable vision for space within the air force – a vision that avoids the pitfalls inherent in the aerospace concept.

A workable vision for the Air Force with regard to space emphasizes the unique military role of space forces – protecting and defending our nation's interest in space. The National Reconnaissance Office, the other services, as well as civil agencies share the space support mission. The top priority for Air Force Space Command (AFSPC), then, is to advocate for capabilities that protect and defend our national space interests. Effort spent advocating “space support to the warfighter” detracts from AFSPC's resources and potentially infringes on the roles of other organizations. Let warfighters (from any service) advocate for their own space support needs. As the principal space system provider, AFSPC will inherit responsibility for warfighter support deemed appropriate by the Secretary of Defense. Through this approach, Air Force Space Command can avoid expending effort needed to advocate for capabilities in its prime mission area.

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## CHAPTER 1

### INTRODUCTION

*Space. The possibilities are endless – but there are dangers there. As we explore the fullest promise of space, we must also get ready to protect our interests and freedoms there.*

— Howell M. Estes III  
General, USAF (Ret)

“We are now transitioning from an *air* force into an *air and space* force on an evolutionary path to a *space and air* force.”<sup>1</sup> Since its appearance in the Air Force’s 1997 vision statement, *Global Engagement*, this phrase has been a point of contention within the Air Force and the Department of Defense. The phrase demonstrated a vision on the part of Air Force leadership of space’s potential to have primacy over air. Admittedly the new vision was highly controversial. General Fogelman, then Air Force Chief of Staff, commented upon the unveiling of the new mission that “interest, anticipation, anxiety, and even fear, both inside and outside of the Air Force, are some of the reactions seen to date.”<sup>2</sup> At the time, the phrase raised several questions: What is a “space and air” force? When will the transition occur? What courses of action are required to evolve into such a force? Less than two years after announcing this latest vision, the Air Force changed the wording and

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<sup>1</sup> United States Air Force, *Global Engagement: A Vision for the 21<sup>st</sup> Century Air Force* (Washington, D.C.: Department of the Air Force, November 1996), 7.

abandoned the “air and space” concept completely. Today, if the Air Force is evolving at all, it is evolving to an “aerospace” force. This change was an apparent attempt to defuse some of the questions raised by the “air and space” vision. But it does not. Now the questions are: What is an “aerospace” force and Is the Air Force evolving to it or not?

The answers to these questions are critical to understanding the future vision of the Air Force. Not only is a clearly identifiable target important, a tremendous difference exists between adopting a particularly appealing trademark and developing a plan to accomplish such a transition. The purpose of this paper is to evaluate the Air Force’s progress toward achieving its aerospace vision and, in so doing, evaluate the merits of the aerospace concept. The paper investigates the evolutionary paths upon which other services have embarked to remake themselves and identifies lessons that should be applied to the Air Force’s current evolutionary efforts.

Ultimately, this paper recognizes an enduring controversy over the term aerospace: a term that implies that space and air missions coexist within a single warfighting medium and are therefore the province of the principal force responsible for securing the “vertical dimension” – the Air Force. Further it implies that, given the limited force application capability of space forces, space mission areas should be integrated with air to improve the efficacy of airpower – space is an enabler of decisive airpower rather than the force of decision itself.

Recognizing that space lacks credibility as a warfighting force, this paper proposes a vision for space within the Air Force that moves it toward a force of decision. The vision

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<sup>2</sup> Ronald Fogleman, "Global Engagement," Address to the Smithsonian Institute's Air and Space Museum, Washington, D.C., 21 November 1996, accessed 20 March 2000 at: [http://www.af.mil/news/Nov1996/n19961122\\_961185.html](http://www.af.mil/news/Nov1996/n19961122_961185.html), accessed 20 March 2000.

may not meet the limitless expectations of some diehard space enthusiasts, but it may quell some of the rancor that space enthusiasts within the Air Force feel toward the aerospace concept. In addition, it recognizes the need for the Air Force, as the *de facto* “executive agent for space,”<sup>3</sup> to avoid infringing upon the space needs and responsibilities of the sister services.

## **Methodology**

This paper begins with an investigation of the controversy surrounding the aerospace concepts and concludes with a recommended vision that the Air Force may pursue to achieve primacy in both air and space. It briefly reviews the history of US naval aviation, marine amphibious warfare, and the independent Air Force to determine if previous efforts of other services to evolve into a new kind of force provide lessons for today’s Air Force. The intent of this comparison is to develop indicators of evolutionary progress to be tested against the current air and space integration paradigm. Each of the indicators will be evaluated, but the emphasis by far will be on the evidence of a consistent and shared vision. The other indicators – organizational change consistent with the vision, promotion pathway changes that recognize key leaders within the evolved organization, pursuit of technology to exploit the vision, and external support for the vision itself – will be evaluated in light of the existing (though limited) vision.

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<sup>3</sup> Peter Hays, *Struggling Towards Space Doctrine: US Military Plans, Programs, and Perspectives During the Cold War*, Ph.D. Diss., Fletcher School of Law and Diplomacy, Tufts University, 1994, 169. Referenced from DOD Directive 5160.32.

## **Assumptions**

“As space and air forces are fully integrated into a total aerospace force, future space assets may not be only a force multiplier but may be the force of decision itself.”<sup>4</sup> This quote from Air Force Doctrine on Space Operations indicates that the Air Force may have a problem with its aerospace concept. While on the surface it acknowledges that space power has the potential to be decisive, it falsely implies that to be decisive space must first be integrated with air. This statement is not based in fact or logic, but rather represents an effort to “sell” the aerospace concept as a prerequisite to future space power decisiveness. This paper disagrees with this concept of aerospace and makes the following assumptions:

1. For the Air Force, transitioning to a “space and air” force is a forgotten vision. The aerospace concept is the vision to which the Air Force aspires.
2. Air Force leadership is generally opposed to a separate space force, but neither the other Services nor the National Reconnaissance Office (NRO) want to own the entire space mission.
3. The Office of the Secretary of Defense does not know what to do about space mission delegation, so it defaults to the status quo.
4. The aerospace concept integrates air and space into a singular force wherein the parts that are air and the parts that are space are conceptually indistinguishable from one another.
5. Department of Defense and the sister services do not agree with the aerospace concept because it does not appear to address their particular

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<sup>4</sup> United States Air Force, Air Force Doctrine Document 2-2, Space Operations (Washington D.C.: Department of the Air Force, Aug 98), 3.

space needs and has negative connotations of an Air Force bent on grabbing responsibility for all non-surface operations.

Air Force leaders consistently point out the high cost associated with space systems, accusing the other services of getting a “free ride.”<sup>5</sup> Statements to this effect only support the negative connotations of the aerospace concept within the other services. This point will be further developed in the next chapter.

### **Limitations**

Though this paper proposes a separate vision for the Air Force with regard to space, it does not propose that this new vision must view space as a medium *from* which to project power (other than the information power). Therefore it does not discuss in any detail the merits of weaponizing space. It does assert that weapon systems are required for the control of space and to establish a credible military mission for the space force. But these weapons do not necessarily have to be space-based. It occurs to the author that too often the debate over-space control gets bogged down in the weaponization of space issue when the important issue is how to protect and defend our national space interest. The means that afford such protection are secondary to the recognition of the need to do it.

### **Conclusions**

This paper uses historical examples, current literature and recent speeches and writing of Air Force leaders to support the following conclusions.

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<sup>5</sup> This comment has been made by at least three current or retired General Officers who visited Air University during Academic Year 2000.

1. Without a commonly agreed to definition of the term aerospace, the Air Force will not be successful in remaking itself as an aerospace force.
2. Any description of an aerospace force developed by the Air Force must be supported externally by the Department of Defense and Congress and would benefit from support of the other services and space enthusiasts within the Air Force.
3. In its pursuit of the aerospace concept, the Air Force continues to regard space as support. Until space has a credible warfighting mission, it will continue to be regarded as a support function and continue to lack credibility in the “combat” community.
4. The target vision for the Air Force, if it truly wants to develop a space culture, is to establish a warfighting vision for space. The aerospace concept neglects the potential decisiveness of space power envisioned by space enthusiasts. The Air Force therefore needs a workable vision for space within the air force – a vision that avoids the pitfalls inherent in the aerospace concept.

A workable vision for the Air Force with regard to space emphasizes the unique military role of space forces – protecting and defending our nation's interest in space. The National Reconnaissance Office, the other services, as well as civil agencies share the space support mission. In addition, the launch mission is transitioning principally to a commercial market. The role of the military is not to operate things but rather to defend our nation's interest. The top priority for AFSPC, then, is to be an advocate for capabilities that protect and defend our national space interests. Effort spent advocating “space support to the

warfighter” detracts from AFSPC’s resources and potentially infringes on the roles of other organizations. Let the warfighters (from any service) advocate for their own space support needs. As the principal space system provider, AFSPC will inherit responsibility for warfighter support deemed appropriate by the Secretary of Defense. Through this approach, Air Force Space Command can avoid expending effort needed to advocate for capabilities in its prime mission area.

The purpose of this paper, then, is to identify the shortcomings in the Air Force’s definition of aerospace and recommend a vision for the Air Force that will demonstrate its commitment to developing space power as a credible warfighting option. It may be possible for the Air Force to continue to use the aerospace trademark, but at a minimum the Air Force must first resolve the term’s definitional controversy and then realize that along with the aerospace trademark comes increased responsibility for stewardship

## CHAPTER 2

### DEFINING THE AEROSPACE FORCE

*Aerospace forces possess the flexibility to fight across the spectrum of conflict anywhere on the globe, with the speed and range necessary to support our national security interests.*

Howell M. Estes III,  
General, USAF, (ret.)

#### Introduction

In 1994, Carl Builder of RAND Corporation described the Air Force as lacking an integrating vision for airpower. A lack of integrating vision, according to Builder, unleashed a number of bad tendencies: weak ties to the institution, misguided loyalties, and a focus on systems before missions.<sup>1</sup> Mr. Builder's accusations were an indictment of Air Force leadership and inspired change within the force. Integration has now become the theme of the Air Force with regard to space. The Air Force vision, *Global Engagement*, states the Air Force is on an evolutionary path to a space and air force.<sup>2</sup>

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<sup>1</sup> Carl Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the US Air Force* (New Brunswick, N.J.: Transaction Publishers, 1994), 6.

<sup>2</sup> United States Air Force, *Global Engagement: A Vision for the 21<sup>st</sup> Century Air Force* (Washington, D.C.: Department of the Air Force, 1997), 7.

“Space and air” has since been modified to “aerospace”<sup>3</sup> making the integration theme even more prevalent.

As the Air Force attempts to remake itself as an integrated or “aerospace” force, it faces many challenges both internal and external. These challenges stem from the term’s 1950s origin and an ongoing debate over its meaning. The challenge from outside the Air Force continues to be a lack of agreement on how the “aerospace” should be defined. In addition to definitional issues, challenges come from a general perception by the sister services that the Air Force concept of aerospace does not serve the specific space needs of land and sea services. The final challenge the Air Force faces is internal. The space enthusiasts within the Air Force want “freedom of action” to explore the unique aspects of space warfare. They believe that the differences between space power projection and air power projection will be lost in the integrated nature of an aerospace force.

This chapter discusses each of these challenges and addresses a potential solution to them. Ultimately the Air Force must choose a target aerospace vision before it will be able to evolve.

### **Aerospace – What’s in a name?**

The Air Force controls 85 to 90 percent of the DOD space budget, personnel, and facilities.<sup>4</sup> The vast majority of general officers within the space community are from the Air Force. On the surface, the desire of the Air Force to integrate air and space and

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<sup>3</sup> Howell Estes III, “The Aerospace Force of Today and Tomorrow: Transforming Our Service to Control the Vertical Dimension” in *Spacepower for a New Millennium: Space and US National Security* (Unpublished Draft, 20 Jul 98).

<sup>4</sup> Michael Ryan, “Beyond the Horizon: Realizing America’s Aerospace Force,” address to Annual Space Convention, AFA, Los Angeles, 19 Nov 99, available at: <http://www.af.mil/news/speech/current/sph27.html>, accessed 15 Feb 00.

become an aerospace force should be a non-issue. However, this is not the case for two reasons. First, the origin of the term “aerospace” is mired in controversy. It dredges up negative connotations within the Army, Navy and Space community. Second, the word “aerospace” has at least two military definitions. The difference between the two definitions is profound for those who believe that space is a medium separate from air, and therefore, requires a different doctrinal foundation.

Since its origin in the 1950s, the term “aerospace” has been a controversial. In an essay published in *Airpower Journal* in 1990, Lt Col (ret.) Frank Jennings attempted to clarify the origin of the term and perhaps dispel the controversy.<sup>5</sup> He was the first to publish the word “aerospace” as a single term in 1959. Its usage was an attempt to describe the responsibilities of the Air Force in relation to the other services’ realms of expertise. According to Jennings, the 1954 DoD “Functions Paper” assigned supremacy missions to each service: land supremacy for the Army, sea for the Navy, and air for the Air Force. The expanse of sky for which the Air Force was responsible was not confined to a particular altitude. According to Jennings, General T.D. White, then chief of staff of the USAF, coined the term Aerospace to describe the realm within which the Air Force was responsible for securing supremacy.

Unfortunately for the Air Force, it was not the only service that had missions relating to space. Beginning in the 1940s, the missile defense mission belonged to the Army.<sup>6</sup> If the Army was responsible for missile defense, and missiles traversed space, then the term “aerospace” infringed upon an army mission. The Army rejected the term

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<sup>5</sup> Frank Jennings, “Doctrinal Conflict Over the Word Aerospace,” *Airpower Journal*, vol.4, no. 3 (Fall 1990), 46-58.

<sup>6</sup> Ibid., 47.

“aerospace” as well as the role of the Air Force within the aerospace domain. Likewise the Navy shared a similar distaste for the term. As early as the 1945, the Navy had conducted artificial satellite studies and had begun a program to use rockets to explore the upper atmosphere<sup>7</sup>. By the late 1950s, the Navy had legitimate claims to space with the development of ballistic missile submarines and satellite technology such as the Galactic Radiation and Background (GRAB) signals intelligence system.<sup>8</sup> The Army and Navy rightfully believed that since the Air Force was not the only space force, it followed that they should not call themselves the aerospace force.

Thus the initial and continued use of the term aerospace by the Air Force was viewed by her sister services as a power grab. The Air Force was not responsible for all missions that flowed in and through the air or through space. Therefore, despite the best intentions of Air Force speechwriters of the 1950s to find a term to define Air Force responsibilities, the Aerospace concept was, and continues to be an overstatement of its prescribed role.

Others argue differently. Major Stephen Rothstein, who conducted extensive research on the foundation of the term “aerospace,” concluded that the term aerospace was not in fact a power grab. In his thesis for the School of Advanced Airpower Studies, he argues that the aerospace concept is rooted in the Air Force’s strategic attack mission<sup>9</sup>. The Air Force has a tradition of thinking and strategically and globally. The Air Force’s principal method of attack is vertically from the top down. Thus it was logical for the Air Force to assume that space was the ultimate vertical point of attack for Air Force

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<sup>7</sup> Stephen Rothstein, *Dead on Arrival: The Development of the Aerospace Concept, 1944-1958*, Masters Thesis (Air University: School of Advanced Airpower Studies, June 1999), 23.

<sup>8</sup> Dwayne Day, “Listening from Above: The First Signals Intelligence Satellite,” *Spaceflight*, vol. 41 (Aug 99), 340.

operational concepts. According to Rothstein, the foundation of the aerospace concept was not based on an effort to grab power from the other services. Instead, he argues that the term was based on the recognition that strategic attack from the vertical dimension was the raison d'etre of the Air Force and space was the ultimate vertical dimension. From this perspective one can assume that for purposes of operational attack, space and air are virtually the same.

While the accuracy of Major Rothstein's thesis is not in question, it fails to dissuade this researcher from the conclusion that the aerospace concept is lacking. Air and space are two distinct media.<sup>10</sup> The Aerospace Force, if one should come to exist, must think beyond strategic attack from the vertical dimension to fully leverage space capabilities. Space operations exist to support other operations besides air operations. The defense of our nation's space interests requires space warfighting doctrine quite different from doctrine for Earth-centric strategic attack. Aerospace came into existence as an all-encompassing term; it must therefore, serve an all-encompassing purpose.

Aside from the sister services' distaste for the term itself, and the distrust of space enthusiasts of the intent it holds for space missions, an additional problem exists for the word aerospace. At least two definitions of the term exist within the Department of Defense (DOD). The most recent Air Force basic doctrine that defined the term aerospace stated:

The aerospace environment can most fully be exploited when considered as an indivisible whole. The same basic military activities can be

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<sup>9</sup> Rothstein, 12.

<sup>10</sup> Peter Hays, *Struggling Towards Space Doctrine: US Military Plans, Programs, and Perspectives During the Cold War*, Ph.D. Diss., Fletcher School of Law and Diplomacy, Tufts University, 1994. This point is a major theme of Lt Col Hay's dissertation.

performed in each, albeit with different platforms and methods. Aerospace consists of the entire expanse above the earth's surface.<sup>11</sup>

This most recent Air Force definition is fundamentally the same as it was in 1959.<sup>12</sup>

The DOD definition is different. According to Joint Chiefs of Staff (JCS) Publication 1-02, *Approved Terminology*, aerospace means:

Of, or pertaining to, earth's envelope of atmosphere and the space above it; two separate entities considered as a single realm for activity in launching, guidance, and control of vehicles that will travel in both entities.<sup>13</sup>

While the Air Force sees aerospace as a single medium with similar operational activities, DOD defines aerospace as two separate entities requiring at least a specific or new type of vehicle.<sup>14</sup> Though the differences between the two definitions seem minor on the surface, the deeper implications are profound. Words do matter, especially to space enthusiasts who see air and space as not only physically different but also doctrinally different.

### **“Air and Space” versus “Aerospace”**

Given the controversy and confusion over the true meaning of the word “aerospace,” why did the Air Force switch to the term? If the terms “air and space” and “aerospace” are intended to mean the same thing, should the Air Force use the more or the less controversial term? General Estes explained the reason the Air Force changed

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<sup>11</sup> United States Air Force, Air Force Manual 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. 1 (Washington D.C.: Department of the Air Force, 1992), 5.

<sup>12</sup> Jennings, 48. As written in AFP 11-1-4, 30 Oct 59.

<sup>13</sup> The Joint Staff, Joint Pub 1-02, *DOD Dictionary As Amended by JMGTM-085-97* (Washington D.C.: Joint Chiefs of Staff, Mar 94), 8.

<sup>14</sup> The Air Force does not have a vehicle that operates in both media. Missiles travel through space, and launch vehicles are an expendable method to transport space vehicles from the earth to their operational environment in space. The vehicle that most closely represents the type described within DOD's definition is the space shuttle which is operated by the National Aeronautics and Space Administration.

from “air and space” to “aerospace” was that “aerospace” was more descriptive of the integrated vision the drafters of *Global Engagement* had in mind. While “air and space” implied separatism, “aerospace” implies integration.<sup>15</sup> The *Global Engagement* concept, however, was conceived by predominantly air-minded Air Force general officers. Given that the principal opposition to the term comes from outside this group, should the Air Force have switched terms? To develop an answer to this question, we must first analyze why other services find the term “aerospace” threatening and why the space community finds the term constraining.

In 1982, Lt Col (ret.) David Lupton, who can be classified as a space enthusiast, listed three doctrinal pitfalls associated with the term “aerospace.” First, says Lupton, “aerospace” places dissimilar forces under the same doctrinal umbrella. The current DOD definition recognizes that a specific type of vehicle is required to traverse the aerospace. Second, “aerospace” assigns the characteristics of Air Forces to space and ballistic missile forces. This appears to be true. AFM 1-1 states aerospace forces have “inherent, speed, range and flexibility.”<sup>16</sup> This statement has been a major source of debate.<sup>17</sup> Without going to detail, it is intuitively obvious to space enthusiasts that the current space force structure, made up of satellites in fixed orbits, is inherently inflexible. Finally, Lupton states the term “aerospace” is shrouded in a semantic fog.<sup>18</sup> Given the Army and Navy contention with the Air Force’s use of the term, and the DOD’s usage of a definition that differs from the Air Force’s, this statement also appears to be accurate.

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<sup>15</sup> Estes, 1-3.

<sup>16</sup> AFM 1-1, 5.

<sup>17</sup> Kenneth Myers and John Tockston, “Real Tenets of Military Space Doctrine,” *Airpower Journal*, vol. II, no. 4 (Winter 1988), 58.

<sup>18</sup> David Lupton, “Space Doctrines,” *Strategic Review*, vol. XI, no. 4 (Fall 1983), 37.

Space enthusiasts, therefore, dislike the more integrated aerospace force because it may not make allowances for space forces to develop doctrinal concepts independent of Air Forces. While capabilities to project force do not yet exist within the space force, the adherence to an aerospace vision may limit the development of future power projection capabilities that employ spacepower alone. They believe that like the term itself, the funding for spacepower will become lost in the “semantic fog.”

The next question is why do the other services continue to dislike the term “aerospace?” The animosity can be traced back to the perceived “power grab” of the 1950s (discussed earlier) which is then exacerbated by the memory of the Blue Ribbon Panel of the early 1990s.

In 1992, then Air Force Chief of Staff General McPeak commissioned a panel on space.<sup>19</sup> One of the goals of the Blue Ribbon panel was to achieve efficiencies in the development of space systems. With each service and the National Reconnaissance Office (NRO) developing space systems in independent “stovepipes,” it was obvious that efficiencies could be achieved through consolidation. A major finding of the panel was the Air Force should seek designation as the single manager for DOD space acquisition.<sup>20</sup> However, despite the Air Force’s control 90 percent of DOD’s space business, it was “woefully behind the Army and the Navy in integrating and applying space capabilities on the battlefield.”<sup>21</sup> Why would the other services want to turn over their space requirements to a service that was behind the times? The Army, Navy, and NRO, as well as the General Accounting Office were opposed to the Air Force assuming such an

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<sup>19</sup> David Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership*, revised edition (Maxwell AFB, Ala.: AU Press, 1998), 275.

<sup>20</sup> Ibid., 277.

<sup>21</sup> Ibid..

awesome responsibility. They “questioned the Air Force’s ability to handle the varied space needs of the military space community.”<sup>22</sup>

Given the majority interest the Air Force holds in DOD space, it is highly unlikely that any other military service wants to “own” space. However, the other services do not want to relinquish their interests because they perceive that the Aerospace Force will not have room for their space needs. In 1994, the Air Force Association advisory group on military roles and mission reported that the:

Perception already exists that the space system needs of … other services will never compete well against Air Force requirements for new aircraft. Executive responsibility for satisfying all services’ space requirements carries with it an obligation to dispel this perception.<sup>23</sup>

Unfortunately, the recommended course of action to dispel the perception was to allow each service to seek adjudication through the Joint Requirements Oversight Council (JROC). While the JROC is a viable candidate for such adjudication, perhaps a better alternative (to avoid the bureaucratic delays created by additional oversight) would be for the Air Force to firmly commit to filling the needs of the other services. Such a commitment would entail the formation of an interservice forum or working group, at least during the initial transition, chaired by the Air Force but giving the other services power to resolve problems they may have with the Air Force's space management. This may seem too optimistic a solution; however, the fact that no such commitment has been officially offered by the Air Force as part of their aerospace proposal raises the question of how committed the Air Force really is to being the steward of space within the

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<sup>22</sup> Ibid., 279.

<sup>23</sup> “Facing Up to Space,” *Air Force Magazine*, vol. 78, no. 1 (January 1995), 54.

Department of Defense.<sup>24</sup> In that light, how well does an integrated aerospace concept, a concept that seeks the synergistic unification of air and space capabilities, meet the unique needs of the Army, Navy or Marine Corps?

If aerospace the word and aerospace the concept both create negative perceptions for external entities should the Air Force use a different term? If the Air Force likes the term because it accurately depicts its vision of the future force, is that vision appropriate?

Assuming the two terms were intended to have the same meaning, aerospace and air and space imply different visions for the Air Force. On its face, aerospace describes a vision of integration, the uniting of air and space into an inseparable whole to achieve synergistic effects. Two years ago General Michael E. Ryan, the Air Force Chief of Staff, issued a memorandum to top-level commanders throughout the Air Force. It began: “At CORONA South 98, the senior Air Force leadership committed to the *integration* of air and space power into an aerospace force.” (Emphasis added) Power projection in an aerospace construct is one where the effects of airpower and spacepower are conceptually indistinguishable from one another. At the operational level, aerospace power objectives are Earth-centric.<sup>25</sup> Air and space, on the other hand, espouses a vision of equal partnership, of two families under one roof. Leadership of an air and space force would require equal stewardship of both disciplines. An air and space force would be able to apply airpower and spacepower with an equivalent level effectiveness to secure the national will: not against the same targets necessarily, but in response to the same

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<sup>24</sup> Shiela Widnall, “Steward of Space,” address to the Space Transportation Organization, Washington D.C., 8 May 96. Available at: <http://www.fas.org/spp/military/docops/usaf/di1150.htm>, accessed 17 Feb 00.

<sup>25</sup> Some may argue that aerospace power is earth-centric for geopolitical or security reasons. This may be true. But similar geopolitical and security pressures apply to both an aerospace force and an air and

national objectives. In an air and space force, neither force has administrative supremacy over the other.

Whether or not this makes a difference depends on who is asked. However, if the Air Force is going to remake itself into a new force and develop an integrating vision of aerospace power, some effort should be made to explain what, in fact, an aerospace force is. Therefore, if the Air Force insists that Aerospace Force is its future trademark, the term must have a fixed and acceptable meaning.

### **What is an Aerospace Force?**

While definitions of aerospace and aerospace power are prevalent, a commonly accepted description of an aerospace force is difficult to find. In the absence of a formally agreed to description of aerospace, a speech given by the current Air Force Chief of Staff will be used as a substitute. Beyond the Horizon: Realizing America's Aerospace Force<sup>26</sup> describes the current aerospace domain as an Earth-centric, seamless volume. Since, at the strategic level, all warfare domains are earth-centric (until we are attacked by extraterrestrials), why does the Chief declare the aerospace domain as earth-centric? If Rothstein's thesis is considered, it is because of the Air Force's operational roots in strategic attack of Earth-based targets. One can assume that the Chief's vision of exploiting the vertical dimension is Earth-centric at the operational level not just the strategic. That is to say, the aerospace vertical dimension applies from space through the air in a downward direction rather than from the Earth upward.

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space force. It is the position of this author that "air and space" is more intellectually honest and less doctrinally constraining and is therefore a better vision for the Air Force.

<sup>26</sup> Michael Ryan, "Beyond the Horizon," 1-4.

In addition, the Chief states that the aerospace force invests in space capabilities that support the aerospace matrix, not the space stovepipes implying that the Air Force will invest in space to meet its internal requirements to improve the efficacy of airpower or aerospace power. This investment strategy provides for efficient and effective aerospace forces but may not support those organizations with independent or unique space “needs.”<sup>27</sup> The implication of this strategy for other services is that to meet their space needs, they will have to pay their own way. Finally, the Chief states that the aerospace force integrates capabilities across the aerospace domain to assure the best mix of synergistic capabilities. Again this provides the most efficient use of Air Force resources, but how well does the Air Force definition of a synergistic capability align with those of the other services or USCINCSpace?

### **Is There Room for Space?<sup>28</sup>**

Certainly an integrated aerospace concept has merits, but with so many detractors, is the concept supportable? As discussed earlier, space enthusiasts have a problem with it and so do our sister services. On the surface, and lacking a common description, the aerospace concept does not meet their needs. These groups, however, have limited capability to influence Air Force decisions. Therefore, while the Air Force should at least be aware that concerns exist, Air Force leaders can pursue what they believe is the best course of action. But what about decision-makers above the Air Force? Do the Office of

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<sup>27</sup> Arthur Cebrowski and John Garstka, “Network-Centric Warfare: Its Origins and Future,” *U.S. Naval Institute Proceedings*, vol. 24, no. 1 (Jan 98), available at: <http://www.usni.org/Proceedings/Articles98/PROcebrowski.htm>, accessed 17 Feb 00. The Navy is pursuing the concept of network-centric warfare. Since space communication is the essential ingredient of most long-range networks, perhaps aerospace’s Earth-centric view will limit the Navy’s ability to further develop this new warfighting theory.

the Secretary of Defense (OSD) and Congress accept the aerospace concept? While I have no firm proof that OSD and/or Congress reject the integrated Aerospace Force, certain indicators reflect negatively on this Air Force vision.

The most recent DOD Space Policy released in July 1999 is completely devoid of the term aerospace.<sup>29</sup> Despite efforts by the Air Staff to inject the term into working drafts of the document, OSD removed the term from the final version.<sup>30</sup> In addition, despite the best efforts of the Air Force to gain space executive agency, DOD space policy does not recognize any special status of the Air Force in relation to the other services with regard to the development of space systems. The policy's implication is that each service has the freedom to pursue its own space stovepipe. OSD does not appear to support Air Force space leadership by any name.

In addition, certain members of Congress have expressed dismay over the Aerospace concept. Senator Bob Smith has stated that "fully integrating space-based information capabilities into existing concepts and organizations is an important near-term goal. But if that is all there is to aerospace, then it is a woefully deficient concept."<sup>31</sup> He and perhaps others in congress expect "aerospace" to mean more than space support to air operations. To the extent that Senator Smith has influence on The Hill, the Air Force should perhaps heed his guidance.

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<sup>28</sup> Space is included in Aerospace, but it is limited to the Air Forces vision of space. That begs the question: is there room for alternative visions such as those of space enthusiasts or our sister services?

<sup>29</sup> Department of Defense, *Department of Defense Space Policy* (Washington D.C.: Department of Defense, July 1999).

<sup>30</sup> Forrest Morgan, interview, Maxwell AFB, Ala., 31 Jan 00. Lt Col Forrest Morgan served as a DoD space policy action officer on the Air Staff during the drafting and coordination of DOD Space Policy in 1999.

<sup>31</sup> Bob Smith, "The Challenge of Space Power," *Airpower Journal*, vol. XII, no. 1 (Spring 1999), 34-35.

Recent events demonstrate that Senator Smith's ideas are shared among other members of Congress. The Senate Armed Services Strategic Subcommittee Chairman, Senator Wayne Allard of Colorado, said,

DOD currently tends to treat space as an information medium rather than a power projection medium. Even though DOD has begun to invest significant resources in space control, it has not done enough to develop capabilities to counter hostile satellites. In any case, DOD has only reluctantly pursued critical technologies.<sup>32</sup>

It appears Congress expects more than space support to the warfighter from the aerospace concept.

### **Conclusion**

Air and space and aerospace imply different visions for the Air Force. They imply different priorities, different system capabilities, and different organizational structures. They also imply different levels of controversy. The aerospace concept has little buy-in from space enthusiasts, the Army, the Navy, OSD, and Congress. The air and space concept should have more for two reasons. First, because it does not create a semantic fog, spacepower enthusiasts who maintain a vision of independent force application should support it. Second, because it does not integrate space into an indistinguishable whole, it makes spacepower available to other services for employment in their own way. For these reasons integration within the aerospace concept appears to be the wrong paradigm.

Integration of capabilities is not the vision of the Air Force proposed by Carl Builder. Mr. Builder's vision was one that integrated the Air Force into a singular

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<sup>32</sup> "Congress Tells DoD to Stop Dragging Its Feet: Space Initiative Projects Must be Focused," *Space Business News*, vol. 18, no. 6 (15 March 2000), 8.

culture. To create an *integrated* aerospace culture, there must be *common* vision. The Air Force is attempting to create a *common* culture through an *integrated* Aerospace vision. It appears that the Air Force's is going about it backward.

Perhaps the best definition of an aerospace force is one that combines the best of the new paradigm (integration) and the old paradigm (stewardship). A mutually acceptable Air Force vision, by any name, is one that recognizes air and space as equal partners. Each member of the partnership has the potential to grow and lead the force. It recognizes the increased power projection potential of a united effort (as in aerospace), while at the same time respecting the independence of each partner to project power its own unique way (through stewardship). Finally, a mutually accepted aerospace force concept recognizes that both air and space have the duty to support the needs of the sister services by providing space services that support the operational needs in their particular media. Again this is a big job, but it appears to be one that OSD and Congress expect one of the services to perform. It is the price of space mission ownership. That begs the question: Is the Air Force willing to pay the price to evolve from what it is today and become this type of force?

## **CHAPTER 3**

### **DEFINING AN EVOLUTIONARY PROCESS**

#### **Introduction**

In his award-winning book, *Winning the Next War*, Stephen Rosen discusses the concept of military innovation. His premise is that over the course of modern history, militaries have incorporated technology to change their doctrine and organizational structures to transition from one type of force to another. Specifically, he states that militaries innovate in peacetime when respected senior officers formulate a strategy for change that has both intellectual and organizational components.<sup>1</sup> Indicators of change include changes in the internal recognition system (a new promotion pathway), establishing organizations to incorporate change, and fostering effective civilian intervention (or buy-in) for the change.<sup>2</sup> The most important elements of change, however, are the development of a vision and an allowance for time for the vision to be fulfilled. Each example given by Rosen to describe evolutionary change required a consistent vision of what the force was to become. For the purpose of this paper, a vision is defined as a statement of organizational direction that postulates how victory in war

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<sup>1</sup> Stephen Rosen, *Winning the Next War* (Ithaca, N.Y.: Cornell University Press, 1991), 58.

<sup>2</sup> Ibid., 20-21.

will be pursued. In addition, each successful evolutionary path followed by those forces in peacetime included an extended period of time in order to accomplish that vision.

In this chapter, Rosen's template of innovation is used to identify three examples of military transition. In essence, this is what the Air Force is attempting to do in its effort to evolve from one type of force, the Air Force, to a different type of force, the Aerospace Force. Since the Air Force has not developed a plan to describe its evolutionary path, this chapter will use the examples of naval aviation, marine amphibious warfare and the independent Air Force to identify key indicators of evolution. Once the indicators are identified, they will be applied in the next chapter to the Air Force's current situation. These indicators will be used to assess how much evolutionary progress the Air Force has made.

### **What is an Evolutionary Path?**

If it will be difficult to for the Air Force to defend its position as the preeminent Aerospace Force without a firm definition of what an Aerospace Force is, it will be even more difficult for it to achieve the goal without a plan to get there. “*Global Engagement*’s call to integrate space into the Air Force is the third such initiative since 1989. The Air Force began such a course of action again in 1997 implying that it did not fully integrate space during the previous two attempts.”<sup>3</sup> This statement from *Toward an Air and Space Force* written by Lt Col Mark Jelonek tells a story of an Air Force bent on integrating space into its operational concept. It also says volumes about the internal and external impediments to the Air Force achieving its goal of integrating space into an Aerospace

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<sup>3</sup> Mark Jelonek, *Toward an Air and Space Force: Naval Aviation and the Implications for Space Power* (Maxwell, AFB, Ala.: Air University Press, 1999), 1.

Force. Lt. Col. Jelonek used the naval aviation analogy to explain how the Air Force might be more successful in this its third attempt in the last decade to integrate space.

Unfortunately, analogies have limitations in that no two situations are exactly the same. In addition, decision-makers tend to use analogies to find consistencies that support pre-existing assumptions rather than to examine differences between the current situation and the analogous example.<sup>4</sup> This chapter does not suggest that any one or more analogies describe perfectly the Air Force's current situation. It does, however, suggest that lessons can be learned from historical example. It ultimately suggests that those who fail to learn the lessons of history are doomed to repeat them.

For the purposes of this paper, an evolutionary path is defined as the development of a vision for the future combined with organizational changes to incorporate that vision. The vision itself should be enduring, that is consistent over time. The organizational changes may include promotion pathway changes or policies that recognize individuals or groups that believe in and progress toward making the vision a reality. The final element of an evolutionary path is the development of external support for the vision so that resources or external policy changes needed for organizational change can be obtained.

## **Naval Aviation**

The naval aviation model provides an excellent example of effective evolution. In the early 1920s, Navy leadership developed a vision of how aviation could be used to improve the accuracy of naval gunfire. Later this vision was expanded to include a strike

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<sup>4</sup> Yuen Foong Khong, *Analogies at War* (Princeton: Princeton University Press, 1992), 37.

role for aviation, specifically extending the range of naval firepower from the sea. At first, the US Navy took the view that carrier-borne aircraft would be useful principally in scouting for the main battle fleet. A few renegade thinkers had more expansive ideas of what is now called a power-projection role against targets ashore.<sup>5</sup> The process of change extended from the 1920s and was not completed until after World War II was underway. During this long evolutionary process, however, the Navy never lost focus on the ultimate vision: to extend the range of and accuracy of fleet power-projection.

The father of naval aviation was Rear Admiral William Moffett.<sup>6</sup> Admiral Moffett was chosen as the first Chief of the Bureau of Aeronautics because he met the fundamental qualifications of an evolutionary leader. Senior Navy leadership, when looking for the first chief of their aeronautics bureau cited the qualities of rank, presence, judgement and political aptitude as the qualities necessary to lead this new organization.<sup>7</sup> Admiral Moffett was chosen because he possessed these attributes. Notably absent from these requirements was that the leader should be an aviator. Admiral Moffett, in fact, was not an aviator but a battleship captain. It is a testament to the intellectual integrity of Admiral Moffett that, as a member of the old guard battleship Navy, he would serve as a stalwart of the Navy's evolutionary process that would lead to the ultimate demise of his own weapon system.

Admiral Moffett was the architect of the carrier-based Navy. He established the vision of extending the firepower of the fleet and fostered the development of

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<sup>5</sup> David MacIsaac, “Voices from the Central Blue: The Air Power Theorists,” in *Makers of Modern Strategy: from Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton: Princeton University Press, 1986), 632.

<sup>6</sup> Clark Reynolds, “William A. Moffett: Steward of the Air Revolution,” in *Admirals of the New Steel Navy: Makers of Naval Tradition 1880-1930*, ed. James Bradford (Annapolis: Naval Institute Press, 1990), 246.

multicarrier task force doctrine. Under this doctrine carriers were regarded as mobile airfields massed at sea to magnify the effects of their offensive and defensive aircraft.<sup>8</sup> This new doctrine, though scorned by some naval leaders who sought a more limited role for aviation in the Navy, led to technological improvements. Sound strategy and tactics for the employment of naval aviation had a profound effect on the Navy's shipbuilding program. The Congress' increasing the money available for this shipbuilding program evidenced the external buy-in for this new doctrine.<sup>9</sup>

The operational concepts developed by the Navy were tested in exercises and simulations. In the early 1920s the capabilities of aircraft were too limited for the purposes of extending the striking power of the battle fleet.<sup>10</sup> However, massive exercises conducted by the Navy allowed Navy leadership to see the potential of aviation to enhance and extend the range of the fleet's power projection. These exercises played an essential role in the "intellectual breakthrough" that led to the recognition of aviation's essential role in fleet defense in addition to its ability to provide independent striking power.<sup>11</sup>

Moffett also pushed for a promotion process for naval aviators that would allow them to compete for command on equal footing with the career elite of the mainstream Navy. Admiral Moffett recognized some resistance among naval aviators to perform the same sea duties as regular surface fleet officers. However, he realized that being a seaman first was the correct approach to developing future Navy leaders within the aviation community. He understood that naval aviators had to be naval officers first so

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<sup>7</sup> Rosen, 77.

<sup>8</sup> Ibid., 79.

<sup>9</sup> Ibid., 79.

<sup>10</sup> Ibid., 68.

they would understand how aviation should be used as an instrument of power projection in conjunction with the fleet.<sup>12</sup> He therefore saw the need for naval aviators not to be isolated from Navy line promotion process.

In addition, the Department of the Navy made it official policy that naval aviators were seamen first.<sup>13</sup> Despite the complaints of aviators, Admiral Moffett insisted that naval aviators not allow their ship-driving skills to atrophy. He also sought to increase the general aviation knowledge of non-aviators within the navy by “getting aviation afloat by putting planes on everything from submarines to battleships.”<sup>14</sup> Through his efforts, he allowed naval aviators to remain competitive for senior leadership positions within the navy and increased the awareness and internal buy-in among the mainstream Navy of aviation as another tool for naval power projection.

Naval fleet aviation originally supported existing battle fleet missions. It then expanded to incorporate new missions commensurate with its growing technological capabilities. However, the growth of naval aviation would not have been possible without firm grounding in a vision and the presence of consistent leadership over an extended period of time to foster that vision. Admiral Moffett personified the vision and leadership that led to the successful evolution of the Navy. He ran the Bureau of Aeronautics from 1921 until his death in 1933. He fostered the development of doctrine and technology to pursue the vision and produced aviation leaders, and a promotion

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<sup>11</sup> Ibid., 69.

<sup>12</sup> Jelonek, 30.

<sup>13</sup> Thomas Hone, “Navy Air Leadership: Rear Admiral William A. Moffett as Chief of the Bureau of Aeronautics,” in *Air Leadership: Proceedings of a Conference at Bolling Air Force Base, April 12-14 1984*, ed. Wayne Thompson (Washington, DC: Office of Air Force History, 1986), 97.

<sup>14</sup> William Moffett, Chief, Bureau of Aeronautics, to Rear Admiral William Sims, President, Naval War College, letter, subj.: naval Aviation, 31 October 1921, Sims Papers, Box 74, Newport RI, cited in Jelonek, 23.

process for those leaders, to extend that vision beyond his lifetime. Finally, through his political astuteness, he gained approval for his concept within the mainstream Navy, from congressional committees and from the public at large. Through his efforts, he achieved internal and external buy-in for his concept of the future role of naval aviation.

Aerospace concept developers can learn much from the naval aviation example. First, the aerospace concept must have a consistent and commonly recognized vision of the future. Second, a visionary leader should be given control of space within the Air Force to foster organizational changes that pursue the vision over the long-term. Also, the space personnel must develop credibility as aerospace warfighters if they are to achieve parity with airmen in terms of leadership within Air Force organizations. As will be discussed in the next chapter, a lack of warfighting credibility appears to be at the root of why Air Force leaders now, and Aerospace Force leaders in the future, will continue to be airmen. Key to developing credibility for the space force is the development of a space warfighting vision within the aerospace force. Finally, in concert with a warfighting mission for space, the aerospace concept must have external support in order to obtain the necessary resources to achieve the vision. The issue is selecting a warfighting vision that balances credibility and political defensibility.

### **Marine Amphibious Warfare**

The evolutionary process that led to the development of Marine amphibious warfare was much more circuitous than the development of naval aviation. The potential need to seize advanced bases in a non-permissive environment was first realized in 1905,

although the first *full-scale* amphibious exercise was not conducted until 1941.<sup>15</sup> Despite the extended route taken to achieve the vision of an amphibious warfare force, the critical elements of evolution were all present. Marine Corps leadership recognized a need and developed a strategy to remake itself into a new kind of force. Marine Corps promotion processes changed to reflect the needs of the future force. A doctrinal concept drove technological change in the development of new amphibious warfare tools. And the concept was supported both within and without the Marine Corps, though not without significant hurdles along the way. Ultimately, the successful creation of “both doctrine and forces for amphibious operations stemmed from a complex interaction of strategic guidance, service roles and missions, interservice and civil-military politics, and military-industrial collaboration.”<sup>16</sup>

Major Earl Ellis, USMC, was the first person to codify the concept that would later become marine amphibious warfare. He prepared a study in 1921 that analyzed the need to secure advanced basing requirements within the Pacific Theater. He concluded “all ports suitable for use as advanced bases by the US fleet will be denied in some strength. This will necessitate the execution of opposed landing operations.”<sup>17</sup> Marine Corps leadership saw their service as the means to seize these advanced bases. According to the modern day Fleet Marine Forces Manual:

After World War I, our predecessors sought to redefine the Corps which had fought along side the Army in the trenches in France. They focused on the requirement to seize advanced naval bases and develop doctrine for

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<sup>15</sup> Rosen, 81.

<sup>16</sup> Williamson Murray and Allan Millet, *Military Innovation in the Interwar Period* (Cambridge: Cambridge University Press, 1996), 71.

<sup>17</sup> Rosen, 66, quoted from Earl Ellis, “Naval Bases: locations, resources, denial of advanced bases,” transcript, Naval War College Library, 1921.

amphibious operations at a time when other militaries of the world ignored it as – in the aftermath of Gallipoli – an impossible mission.<sup>18</sup>

The Marines and the Navy attempted their first *limited-scope* amphibious exercise in 1924 and continued to conduct them for the next 10 years. Each exercise was hampered by two problems. First, the transport boats available from the Navy were incapable of achieving the rates of troop movement required to implement the scale of operation needed to achieve the necessary firepower. Second, the Navy did not deem it necessary to practice naval gunfire in support of land offensives and, therefore, were ill prepared to target and attack opposing forces in support of a marine assault.<sup>19</sup> These technological and doctrinal shortfalls were the subject of heated debates between the Marine Corps and Navy leadership.

The Marine Corps focused its doctrinal writings on amphibious warfare throughout the 1930s.<sup>20</sup> Their concepts were dependent on changes in Navy operations. The only way to negate the firepower inherent in the fixed positions being assaulted by mobile marine forces was through the employment of massive naval gunfire and aerial support.<sup>21</sup> In addition, effective landing craft and amphibious tractors were necessary to project sufficient power in a limited amount of time.

The Navy manages the budget for all naval forces including the Marine Corps, but provided only limited funding for the technological needs of the yet unproven amphibious assault concept. Fortunately for the Marines, however, former Assistant Secretary of the Navy Franklin Roosevelt became president. His personal relationship

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<sup>18</sup> United States Marine Corps, Fleet Marine Forces Manual 1-0, *Leading Marines* (Washington, D.C.: Department of the Navy, Jan 95), 71.

<sup>19</sup> Murray and Millet, 74-75.

<sup>20</sup> Ibid., 75.

<sup>21</sup> Ibid., 77.

with the commandant of the Marine Corps and self-image as an honorary Marine improved the opportunity for the Marines to develop the tools to support the amphibious warfare concept.<sup>22</sup> Unfortunately for the Marines, however, the classified nature of amphibious assault war plans limited the ability of Marine Corps leadership to discuss the concept in a public forum.<sup>23</sup> Therefore, the Marines had internal buy-in for the new concept among the younger officers and external buy-in from the executive branch. However, they had issues to resolve with the Navy, and could not get public support on their side due to classification issues associated with amphibious assault planning.

Despite these limitations, however, the Marines were successful in evolving into the Amphibious Assault force of the US armed forces. They did this through the patient development of amphibious warfare doctrine and capabilities and by judicious spending of the limited funding provided by the Navy. In addition, the Commandant of the Marine Corps persuaded the Chief of Naval Operations to establish the Fleet Marine Force (FMF). This force provided the nucleus of the amphibious assault force; by ensuring that an integrated contingent of marines was available with the fleet at all times. The formation of the FMF provided “for the first time, a permanent organization for the study and practice of amphibious warfare.”<sup>24</sup> It also provided the Corps with the means to execute more effective amphibious landing exercises with the Navy afloat.

Working around the classification issues, the Commandant lobbied Congress to “allow the corps to retire overage officers, who had been promoted by virtue of their seniority.”<sup>25</sup> He did this to make room for a new breed of officers more open-minded

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<sup>22</sup> Ibid., 78.

<sup>23</sup> Rosen, 82.

<sup>24</sup> Ibid., 83.

<sup>25</sup> Ibid., 84.

toward a new way of war. In this way, he effectively would recognize those officers who were proponents of amphibious warfare and eliminate those who were not. The end result of each of these initiatives combined to create the modern Marine Corps: an effective amphibious assault force.

Thus each of the indicators for evolution was present in the example of the Marines transition to an amphibious warfare corps. The vision was established by Major Ellis and fostered by Marine leadership. Marine leadership was able to establish external buy-in for the concept through presidential support. Organizational changes made available the tools of amphibious warfare at the “pointy end of the spear.” And finally, the excommunication of the old guard made room for right minded future leaders who saw the potential of amphibious warfare to remake the Marine Corps. Once World War II demonstrated the need for the capability, the benefits of the pre-war development, planning and exercises proved worth the limited cost.

For aerospace leaders, this Marine example offers two important lessons. The first lesson is that innovative approaches to warfighting can offer significant improvements to our nations ability to project power. Space warfighting is a diamond in the rough. Pursuing space support to the warfighter as the principal means to leverage space is a very narrow vision with little potential to fully exploit space power. Second, should the Air Force wish to fully exploit the promise of space warfighting, they could seek to excommunicate the old guard by assigning right-minded space leaders to upwardly mobile positions within the air staff and major commands. Right-minded space thinkers are not those who seek to improve airpower; they are those who seek to develop space power as an independent power projection capability.

## **Independent Air Force**

The developmental pattern of the US Air Force includes many of the key indicators described in the previous two sections. The foundering fathers of the US Air Force, people like General William “Billy” Mitchell and General Henry “Hap” Arnold, had a vision of air power as an independent force. The Air Force was developed from a foundation within an Army culture. Fortunately, the army’s organizational structure in peacetime included, as is does today, the establishment of separate branches with each branch responsible for developing its own core of leaders. The branch structure allowed the Army Air Corps an element of autonomy, and the Air Corps leaders took full advantage of this autonomy to develop its own doctrine, promote its own leaders, and design and build its own air systems. The institutional leadership of the Air Corps also fostered external relationships with influential members of Congress and the American public and developed a high level of air-mindedness among these groups. The combination of these key indicators in concert with the successful application of airpower in World War II led to the National Security Act of 1947, which established the Air Force as a separate and independent service.

The foundation of an independent Air Force can be traced back to World War I. The beginnings of flight saw the airplane as a means to observe the enemy from great distances. It provided at the time the ultimate high ground. The use of the high ground soon expanded to the role of artillery spotting, thus improving the accuracy of the army firepower. These initial roles of spotting and observation were described by the term “air

service.”<sup>26</sup> The Air Service was relegated to support missions, acting as a force multiplier to the main effort being conducted by cavalry, artillery and infantry.

Within the Air Service, however, there were a number of single-minded individuals who saw the greater potential of air power. While the technology of airpower during WWI was a limiting factor, many saw past these limitations to an application of air power as a decisive weapon in and of itself. If sufficient firepower could be loaded onto an aircraft, it was presumed, then that aircraft could deliver a decisive blow to the vital centers of the enemy’s infrastructure.

As early as 1913, Arnold began to speculate on the strategic role air power might play in the future. In an article published in the *Infantry Journal* that year, he wrote, “The actual damage that can be done to objects on the ground from an aeroplane is very limited. But if 200 to 300 bombs are dropped in or around a column of troops, there would be some confusion and demoralization even if the damage inflicted was slight.” He emphasized that if a powder charge were “dropped into a city it would certainly cause considerable damage.”<sup>27</sup>

This level of analysis indicates that a vision of the independent utility of the air weapon was alive and well in the US military before WWI. The term “air force” was developed to describe the application of airpower as the independent capability to strike at city centers.<sup>28</sup> “But young airmen like William Mitchell and Henry Arnold, who would later lead the fight for aviation’s autonomy, were content before 1917 to remain wards of the Signal Corps, unsure as yet that they had either the doctrine or the political resources to fly on their own.”<sup>29</sup>

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<sup>26</sup> Carl Builder, *The Icarus Syndrome; The Role of Air Power Theory in the Evolution and Fate of the US Air Force* (New Brunswick, N.J.: Transaction Publishers, 1994), 63.

<sup>27</sup> Edgar Puryear, Jr., *Stars in Flight: A Study in Air Force Character and Leadership* (Novato, Ca.: Presidio Press, 1981), 20 Quotations taken from 1<sup>st</sup> Lt Henry Arnold, US Infantry, “Air Corps and War,” *Infantry Journal*, vol. 10 (July 1931 - Jun 1941), 229.

<sup>28</sup> Builder, 63.

<sup>29</sup> Michael Sherry, *The Rise of American Airpower: The Creation of Armageddon* (New Haven, Conn.: Yale University Press, 1987), 11.

The debate over independence for the air service began in earnest following WWI. Within the army the debate focused on whether airpower's proven capability as a "service" (in support of ground operations) should be its only application or whether the as yet unproven concept of strategic bombing should be pursued thereby yielding to an air "force" concept. Even though the ability to conduct strategic bombing on a large scale was unproven, the results of the Zeppelin attacks on London had a profound enough effect on England that she declared the Royal Flying Corps a separate service. Thus, while the leadership within the US Army tended to side with the more limited service definition, the more enthusiastic airmen, citing the British example, pushed their vision of a more decisive role for airpower and for the independent application of it.

The Army branch structure not only allowed exceptional airmen to be promoted to leadership positions within the branch, it also afforded them a level of autonomy in the development of doctrine. In early 1920, the War Department authorized the establishment of eleven Air Service schools to provide for the professional development of Army airmen.

Shortly after the authorization of the Air Service schools, the Field Officers Course became the Air Service Field Officers School. The school was designated the Air Corps Tactical School in 1926. Over the next several years, the focus, scope, and intent of ACTS grew and changed; it became the <sup>30</sup>guiding force for aviation technology and doctrine development.<sup>31</sup>

The principal focus of ACTS doctrine was the "industrial web" theory. On the surface, industrial web theory provided an analytical approach to identifying vital targets that would "lead to the fatal weakening of an industrialized enemy nation."<sup>31</sup> It was also the

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<sup>30</sup> H. Dwight Griffin et al., *Air Corps Tactical School: The Untold Story* (Maxwell AFB, AL: Air Command and Staff College, May 1995), 4.

<sup>31</sup> Ibid., 17.

embodiment of the airpower vision prescribed by the lessons learned of WWI: the most effective use of airpower was as an offensive weapon; and bombing cities would have a demoralizing effect.<sup>32</sup> Industrial web theory specifically recognized once the industrial targets were attacked, “if enemy resistance still persists … it may be necessary … to apply force … by directly attacking cities.”<sup>33</sup>

Thus ACTS extended the decisive airpower vision by providing it an analytical basis. In addition, the analytical basis allowed for a more rigorous review of the technological requirements to achieve the vision. The debate between the Air Service concept and Air Force concept may have created a problem for how to spend limited funding to achieve the ACTS vision; however, according to Carl Builder:

Once the intellectual separation between air service and air force had been accepted, the rapid evolution of aircraft technologies would favor the air force part of the two because the effectiveness of bombardment aircraft was much more dependent on enhancements in speed, range and payload than that of observation aircraft.<sup>34</sup>

Because observation aircraft benefited from technological improvements in airframes, the air service needs could be met with minimal impact on the doctrinal plans of the ACTS airmen. “Technology … seemed to be keeping pace. The new B-17 had the range, speed, altitude and bomb-carrying capacity deemed necessary [to implement the industrial web targeting concept]. And when orders were placed for improved models of the … new Norden Mark XV bombsight in 1933, it appeared”<sup>35</sup> that the doctrinal concept would be achievable.

Thus far, the development of the independent air force has included a long-standing vision of independent decisiveness, a separate promotion pathway for the recognition of outstanding airmen, separate schools to explore doctrinal concepts and a

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<sup>32</sup> Builder, 47.

<sup>33</sup> Griffin et al., 17.

<sup>34</sup> Builder, 64.

<sup>35</sup> MacIsaac, 634.

technology budget to make those doctrinal concepts a reality. The missing link that allowed all of this to occur is the external support afforded the Air Service. External support gave the Air Service room to explore industrial web and strategic bombing concepts independent from Army influence.

Influential leaders like Billy Mitchell can be credited for much of the external support afforded the Air Service. In his book *Winged Defense*, General Mitchell described an air force that could provide coastal defense much more cheaply than the Navy. Though often overstating its capabilities and underplaying its limitations, he described the potential impact of the airplane in both military and economic terms. He inspired public interest in aviation by insisting that the Air Service take part in air shows. He also was very selective in his choices for who would become airmen. He chose only the best. While this created the impression of elitism within the Air Service, it also ensured that the Air Service would be the best-educated and most technologically advanced military corps.

With a decisive vision, doctrinal underpinning, an elite corps of aviators, and external support for the development of airpower, the technological shortfalls were only a minor setback. Strategic bombardment of industrial web targets was an unproven concept at the beginning of WWII. But it was the evolutionary path upon which the independent air force had embarked. According to the Strategic Bombing Survey:

The experience of the Pacific war supports the findings of the Survey in Europe that heavy, sustained and accurate attack against carefully selected targets is required to produce decisive results when attacking an enemy's sustaining resources... For the future it is important fully to grasp the fact

that enemy planes enjoying control of the sky over one's head can be as disastrous to one's country as its occupation by physical invasion.<sup>36</sup>

With the technology provided by the long-range bomber, the Norden bombsight, and the atomic bomb, Hap Arnold's 1913 vision of the strategic role of airpower had become a reality by war's end. The independent air arm "would owe its establishment to an ability to perform a unique mission that could not be achieved by any of the other services."<sup>37</sup> And by the end of World War II, the Army Air Force had the doctrine, tools, organization, personnel, and external support to become an independent force.

As the Air Force moves to become an aerospace force, looking back on our roots as an air service may be useful. Did airmen who believed in the decisiveness of airpower view themselves as only support to ground forces? Likewise should space enthusiasts who are being called upon to support airpower look beyond this limited application of spacepower? What organizational changes has the Air Force made to foster space warfighting concepts? Does the Air Force realistically believe that without fostering growth in its space warfighting capabilities, that space will develop decisive power projection capabilities? Unless the Air Force allows space to pursue independent warfighting concepts, space personnel may never develop the credibility necessary to lead the aerospace force. The Army's view of airpower as only support to ground operations was a mistake. Similarly, an Air Force vision that views spacepower as only support to air operations is also a mistake.

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<sup>36</sup> Department of Defense, *The United States Strategic Bombing Survey*, reprint (Maxwell AFB, Ala.: Air University Press, October 1987), 110.

<sup>37</sup> MacIsaac, 635.

## **Conclusion**

As the Air Force embarks upon its own evolutionary path to remake itself as an aerospace force, it will face many of the same challenges other services have faced. In order to achieve success, the Air Force must have a consistent and coherent vision of what the Aerospace Force is, it must have organizations and promotion pathways to develop and recognize the best of those who pursue that vision. It must focus its budget on technological improvements that lead to the achievement of the vision. Finally, it must have external buy-in for its aerospace concept to obtain the necessary resources to develop into such a force.

As was stated up-front in the chapter, no two situations are exactly the same, and none of the situations presented in these previous analogies provides the perfect model for how the Air Force should evolve. The Navy example reflects organizational and doctrinal changes focused on a way to improve its existing power projection mission. The Marine Corps' changes were focused on a total remake of itself into a new type of force. The independent air force example demonstrates how changes may occur to develop a separate and unique way of war though the establishment of a separate force. While each of these examples demonstrates change for a different purpose, each change in fact had a purpose, and that purpose was both enduring and institutionally supported. Their purposes were captured in their vision. Does the Air Force have such a vision with regard to aerospace? Did it have such a vision with regard to space and air?

The next chapter investigates where the Air Force is along the evolutionary path, and identifies the successes and the shortcomings of its evolutionary progress.

## **CHAPTER 4**

### **MEASURING EVOLUTIONARY PROGRESS**

*We needed to build an actionable vision. We needed to go beyond lofty statements of intent, to outline a vision specific enough for action, and specific enough so that we could lay out pathways to take us toward our goals.*

The Honorable Sheila Widnall  
25 November 1996

#### **Introduction**

None of the analogies presented in the previous chapter are intended, by themselves, to offer a model for how or why the Air Force should evolve into an aerospace force. The analogies do, however, offer indicators or measures of merit that can be used to evaluate the progress the Air Force is making. The indicators are 1) the existence of a consistent vision, 2) organizational changes pursuant to the vision, 3) changes in promotion pathways, and 4) the development of external support for the vision. If the Air Force is evolving to an aerospace force, what organizational changes have occurred within the Air Force since it decided to embark upon this evolutionary path? What new technologies are being pursued to ensure the development of capabilities to exploit the aerospace concept? Have promotion pathways been established or modified to recognize a new type of aerospace leader? And most importantly, has

there been a consistent vision of what this new aerospace concept is supposed to accomplish, and what is the level of external buy-in for this concept?

In this chapter, the answers to these questions will be addressed. In many cases, the answers are difficult to discern. This chapter will attempt to develop answers from recent writings by aerospace leaders and recent policy decisions from within the Air Force and the Department of Defense. To be fair, the concept of improving the integration of air and space to achieve an aerospace concept existed well before *Global Engagement* stated that an evolution was in progress. These accomplishments will not be overlooked. However, the emphasis of this chapter will be on recent accomplishments. Using the indicators from the previous chapter as a guide, this chapter will attempt to measure the level of evolutionary progress the Air Force has made. It will also offer opinions as to why the progress has been either successful or limited, as the case may be.

None of the previous analogies is synonymous with the current Air Force situation, notwithstanding the opinions of the few who advocate for a separate space force. It is interesting to note that in each case discussed in the previous chapter the first step toward a successful evolution was the establishment of a vision – a target at which to shoot. In addition to the vision, each evolutionary process was accompanied by, and gained support from, an influential external advocate. With this in mind, this chapter evaluates the vision and external buy-in of the aerospace concept first, and offers observations of organizational change and promotion pathways only as they support achievement of the vision.

## **What is the Air Force Vision?**

As this paper has stated repeatedly, the most important factor in evolutionary change is the development of a vision. In addition, this vision must be consistent over a long period of time so that it can develop a following and so that those who work to implement the vision have a fixed target for which to aim. When the vision of becoming a space and air force was first articulated in 1996, the concept focused on integrating two cultures, the space and air cultures, under one force structure. According to the Secretary of the Air Force, in the development of *Global Engagement*:

We had a few guidelines in mind as we established [the] effort:

We needed to define a corporate vision. We knew we must draw on the expertise that extends through the width and breadth of the Air Force to get to the right solutions, and more importantly, to ensure any vision would be a shared view.

We needed to build an actionable vision. We needed to go beyond lofty statements of intent, to outline a vision specific enough for action, and specific enough so that we could lay out pathways to take us toward our goals.

We needed to construct a comprehensive vision because, although operations are at the heart of what we do, they are only one component of the changes we must make to achieve our objectives. It is our people that create combat capability from the metal and plastic of our equipment. We must ensure we bring in quality people, train them, retain them, [and] build a sense of institutional identity across our force.<sup>1</sup>

These guidelines were impressive and comprehensive. Unfortunately, little evidence exists that they have withstood the test of time. The original vision underwent careful review and raised questions, concerns and fears both within and without the Air

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<sup>1</sup> Sheila Widnall, "Adapting to an Altered Strategic Environment," address to the Center for Strategic and International Studies, Washington, D.C., 25 Nov 96, available at: [http://www.af.mil/news/speech/current/Adapting\\_To\\_An\\_Altered\\_Stra.html](http://www.af.mil/news/speech/current/Adapting_To_An_Altered_Stra.html), accessed 20 March 2000.

Force.<sup>2</sup> From these guidelines, it appears that the intent of Air Force leadership was to establish a vision that emphasized the need to establish a new culture within the Air Force. The new culture would recognize the difference between air and space while, at the same, time recognizing that a level of operational synergy was possible if the two cultures could be combined. The concept of a culture shift was prescribed for the Air Force in Carl Builder's book, *The Icarus Syndrome*, discussed in Chapter 2. Both an air and a space culture exist within the Air Force. Based on the speeches and articles referenced above, it appears that the *Global Engagement* vision intended to integrate the cultures first and the capabilities second.

Shifting to an aerospace concept has reversed this trend. Aerospace integrates air and space capabilities to improve the effectiveness of air operations. Today airpower is the force of decision within the Air Force, while space is the force multiplier. However, according to Air Force space doctrine written two years after the development of *Global Engagement*, “as space and air forces are fully integrated into a total aerospace force, future space assets may not be only a force multiplier but may be the force of decision itself.”<sup>3</sup> While this statement indicates a bias within Air Force doctrinal channels for the aerospace concept, it does not explain how or why integrating air and space capabilities improves the decisive nature of space power. Why do space capabilities need to be integrated with air capabilities for anything other than the betterment of airpower?

Today's Air Force leaders, specifically the current chief of staff and service secretary, do not appear to be as pro space and their predecessors. The current chief of

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<sup>2</sup> Ronald Fogleman, "Global Engagement," address to the Smithsonian Institute's Air and Space Museum, Washington, D.C., 21 November 1996, available at: [http://www.af.mil/news/Nov1996/n19961122\\_961185.html](http://www.af.mil/news/Nov1996/n19961122_961185.html), accessed 20 March 2000

staff as well as the Air Force Doctrine Center is wedded to the aerospace concept. The two media, air and space, cannot be separated for operational reasons.

I submit that as the second half of the 20th century has matured the air realm, the first half of this next century will mature our aerospace realm. The domain that it will encompass will be from the surface of the earth to the most distant satellite or spacecraft. There are those who would want to separate the aerospace domain. It's an oxymoron that they would want to work space in a vacuum. But for me that would be like separating the mountains from the valleys or the oceans from the seas – it makes no sense militarily. And for the foreseeable future, the aerospace realm will remain earth-centric.<sup>4</sup>

While this statement may be a poetic and “lofty statement of intent,” it offers little explanation as to why the air and space media must be combined in order for either one to be a more effective instrument of military power. Those who describe aerospace as two separate media do not want to work space power in a vacuum any more than those who work air, land or sea would work those forces in a vacuum. They simply recognize that there are fundamental differences between aerodynamics and astrodynamics. Because of these differences, just as sea power and ground power offer different courses of action to national decision-makers, space power and airpower may offer new and better courses to pursue national objectives when considered separately.

In addition, they recognize that space power must be viewed beyond its potential to serve and be served by integration with air. What about space and ground power, or space and sea power? In 1959, a US Army general testifying before the House Committee on Science and Astronautics was asked if he had heard the term “aerospace.” He jokingly replied, “Well, I never heard of the term before. I always heard of

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<sup>3</sup> United States Air Force, Air Force Doctrine Document 2-2, *Space Doctrine* (Maxwell AFB, Ala.: Department of the Air Force, Aug 98), 3.

‘armospace.’”<sup>5</sup> The tenor of the General’s statement was as true then as it is today: the integration of air and space is no more or less vital to our national security than the integration of space and any other force.

Beyond the Chief of Staff Level, the new Secretary of the Air Force also appears to lack an inspiring vision for the Air Force in the space arena. In a recent speech titled “The State of Air Force and its Future,” the Secretary discussed eloquently the exploits of the expeditionary aerospace force and how the Air Force is an integrated team. He also described how important space support was to the execution of airpower in Kosovo. No doubt these are important issues for the Air Force today. However, when he discussed the future of the Air Force and its efforts to modernize, the tenor of his message did not change. Space, in the future, looks pretty much the same as it does today. Mentioning space almost as an afterthought, on page 11 of a 14-page speech the Secretary said, “And lest I be accused of ignoring missiles and space, Minuteman modernization is our number two upgrade program. In fact, we are funding replacements and upgrades for every one of our existing satellite systems.”<sup>6</sup> That was it. The future of space is upgrade the Minuteman and replace existing satellites with new, improved versions. While this speech may not be the sum total of everything the Secretary envisions for space, it is interesting to note that the speech was delivered in Los Angeles, California – where the majority of this country’s space systems development occurs. It would seem, given the

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<sup>4</sup> Michael Ryan, “Beyond the Horizon: Realizing America’s Aerospace Force,” address to the Annual Space Convention, AFA, Los Angeles, Ca., 19 Nov 99, available at: <http://www.af.mil/news/speech/current/sph27.html>, accessed 15 Feb 00.

<sup>5</sup> Frank Jennings, “Doctrinal Conflict Over the Word Aerospace,” *Airpower Journal*, vol.4, no. 3 (Fall 1990), 48. Statement quoted from the House, Missile Development and Space Sciences: Hearing before the Committee on Science and Astronautics, 86<sup>th</sup> Congress, 1<sup>st</sup> session, February and March 1959, 76-77.

audience, that if the secretary had a more lofty vision for space, this would be the place to discuss it.

The shift in emphasis away from the *Global Engagement* vision – a shift from equivalent primacy for space and air to a vision of integrating space to support the air mission –has also occurred below the Air Force management level. When the words “to a space and air force” were first published, the Commander of Air Force Space Command had a vision for space forces that emphasized space control first and space support to the warfighter second. The next Commander of Air Force Space Command reversed this emphasis, putting space support to the warfighter as his first priority.

General Howell Estes III was a staunch advocate for the protection of our space assets, the development of space as a separate area of responsibility, and the vision of space as a strategic center of gravity. In his final testimony before Congress in 1998, he used the analogy of US dependence on oil to demonstrate the need to develop a new national mindset regarding space:

When World War II-era Americans understood oil's value to military operations, they could more readily accept a North Africa strategy in lieu of direct, perhaps expedient, attacks on German soil. They also had a framework to put the high cost of air raids on Axis oil fields and refineries into context. The oil shock of the 1970s forced Americans to also recognize their dependence on oil to commerce and their way of life. The result is an ingrained sense of oil as a military and economic center of gravity. Thus, the public debate surrounding oil is now very sophisticated. Americans recognize the need for a separate unified command covering the oil region, they accepted a permanent overseas presence there, they were ready to endure thousands of projected casualties in the Gulf War, they have maintained international sanctions against Iraq for an unprecedented duration.

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<sup>6</sup> F. Whitten Peters, “The State of the Air Force and its Future,” address to the South Bay Chamber of Commerce, Los Angeles, Ca., 20 January 2000, available at: <http://www.af.mil/news/speech/current/spch01.html>, accessed 15 February 2000.

The same level of sophistication is in its infancy for space. Americans seem unaware that just as oil drives the engine of today's industrial society, space will drive the engine of tomorrow's information society. As an emerging center of gravity, space capabilities impact almost every industry, every person, and every military strategy.... I believe the public must come to a better understanding of their basic dependence on space systems.<sup>7</sup>

Because he recognized that the US depends on space for not only military, but also political and economic strength, he emphasized the protection and defense of the space medium as his top priority. Citing the example of how Americans came to view oil and oil producing countries as vital to our national interest and as elements of our national security that should be protected, he expanded the oil metaphor to describe the need for a change in attitudes toward space. He did not neglect the needs of the Air Force or the other Services for space support, but he did place those needs as secondary to his principal purpose: protecting and defending the space medium. This concept of the use of space forces for the defense of the space medium will be discussed in greater detail in the next chapter; however, the point is introduced here to emphasize the differing vision of General Estes, one of the architects of *Global Engagement*,<sup>8</sup> and his successors.

General Estes was a true space visionary. Despite his background as a fighter pilot, he understood the importance of space capabilities and the influence space power could have on securing the national interests of the United States. His experience on the Joint Staff gave him key insights into how space capabilities supported the needs of all of the services, not just his own. As an influential member of the Air Force leadership team,

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<sup>7</sup> Howell Estes III, "US National Security Space Programs and Policies and the DoD Budget Request for FY 1999 and Future Years Defense Program," testimony before the Senate Armed Services Committee Strategic Forces Subcommittee, 11 March 1998, available at: <http://www.spacecom.af.mil/usspace/testim98.htm>, accessed 23 March 2000.

<sup>8</sup> As member of CORONA, General Estes influenced the content of *Global Engagement*.

it is likely that his vision of space shaped the view of the Air Force toward space and, in turn, influenced the air and space vision of *Global Engagement*.

Upon the departure of General Estes as Commander of Air Force Space Command, the vision of an evolutionary path toward a space and air force within AFSPC shifted. The new Air Force chief of staff preferred the aerospace trademark to air and space. The new vision of the aerospace force was integration.<sup>9</sup> And the subsequent commander of AFSPC was sold on the concept. Less than a year after the testimony of General Estes cited above, the new AFSPC commander, General Myers, stated the following:

Integration is a key task facing everyone in the space business. Integration drives our national efforts to partner, our military efforts to enhance jointness, and our Service efforts to operate in a seamless vertical dimension. ... If we get this integration right, we can make enormous strides toward shaping this uncertain era. That's an important point. We're all operating in a common, uncertain environment. It doesn't help anyone to have divisiveness between air and space, one Service and another, or government and industry. We are all in the same boat and we all need to work on this concept of integration together.<sup>10</sup>

The priority for General Myers upon assuming command was to implement the aerospace vision proposed by the new Air Force chief. It is completely understandable that one would wish to do the bosses bidding. However, as the chief of the space forces within the aerospace force, General Myers had a duty to exploit space power to its maximum advantage. The legacy of General Estes was ready for exploitation. Yet

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<sup>9</sup> It is not the purpose of this paper to pose integration as a negative concept. Integrating can achieve efficiencies and synergies that improve the overall effectiveness of the forces being integrated. However it must also be realized the integration can also cause each force being so integrated to lose some or all of its identity. And since airpower has existed longer than space power, it is the contention of the paper that the separate space identity may be lost before it is even formed.

<sup>10</sup> Richard Myers, "Integrating Space in an Uncertain Era," address to the Air Force Association, Los Angeles, Ca., 13 Nov 98, available at: <http://www.peterson.af.mil/usspace/speech11.htm>, accessed 5 April 2000

General Myers priorities downplayed space control in lieu of “space support to the warfighter.”

**Table 1. AFSPC Prioritized Programs**

Near-Term Priorities (1999 – 2007)	Far-Term Priorities (2014 – 2025)
<ol style="list-style-type: none"> <li>1. Space-Based Infrared System (SBIRS High, Low)</li> <li>2. ICBM Sustainment ( SERV, GRP, PRP, DIRECT, MEECN, Armored Vehicles, DDT, PAS)</li> <li>3. Evolved Expendable Launch Veh (EELV) (Med &amp; Hvy)</li> <li>4. GPS (IIR, IIF)</li> <li>5. MILSATCOM (Adv EHF, Polar Final, Adv SHF, Gapfiller SHF/Ka)</li> <li>6. Range Modernization &amp; Automation (RMA)</li> <li>7. NORAD/USSPACECOM Warfighting Support System (N/UWSS)</li> <li>8. AFSCN Upgrades (COMMU, RANGEU)</li> <li>9. Space Surveillance Upgrade (GEODSS Upgrades, SATA)</li> <li>10. Space-Based Radar (SBR) (Discoverer II, GMTI)</li> <li>11. National Polar Orbiting Operational Env Satellite System (NPOESS)</li> <li>12. Space Environmental Sensor Upgrades (SEON, CEASE, Solar Wind, Ground Sensors, etc)</li> <li>13. Space Maneuver Veh (SMV)/ Space Ops Veh (SOV)</li> <li>14. Defensive Counter Space (STW&amp;ARS)</li> <li>15. Ground Based Strategic Radar Upgrades (BMEWS, PAVE PAWS &amp; PARCS Upgrades, LRDBTR)</li> <li>16. Conventional Strike (CAV, CBM, HSPP)</li> <li>17. Space-Based Deep Space Imager</li> <li>18. Advanced Space-Based Terrestrial Situational Awareness (Hyperspectral Imaging, AEOWS, NBC Detection, CC&amp;D Protected Targets, HDB Targets)</li> <li>19. Ground-Based Jammers (RF, Laser)</li> <li>20. LEO ASAT</li> <li>21. Radar Imager Network (HAVE STARE Follow-on)</li> </ol>	<ol style="list-style-type: none"> <li>1. Space-Based Radar (SBR) w/ Air Moving Target Indicator</li> <li>2. Space Mnvr Veh (SMV)/Space Ops Veh (SOV)</li> <li>3. Space-Based Laser (SBL)</li> <li>4. Advanced Space-Based Terrestrial Situational Awareness (Hyperspectral Imaging, AEOWS, NBC Detection, CC&amp;D Protected Targets, HDB Targets)</li> <li>5. Conventional Strike (CAV, CBM, HSPP)</li> <li>6. Ballistic Missiles (BMR, Sustainment)</li> <li>7. Long Range Dual Band Transportable Radar (LRDBTR)</li> <li>8. Defensive Counter-Space ( STW&amp;ARS, Active on-board protection)</li> <li>9. Space-Based Electro-Optical Network (SBEON)</li> <li>10. Space-Based Data Relay (SBDR)</li> <li>11. Radar Imager Network</li> <li>12. Improved Space Environment Models &amp; Space Environment Sensor Upgrades</li> <li>13. Upgrades to Navigation: Space Segment (GPS Modernization)</li> <li>14. Terrestrial Weather Sensor Upgrades</li> <li>15. Expendable Launch Vehicle (ELV) Follow-on</li> <li>16. Space-Based Launch Ranges (SBLR)</li> <li>17. Advanced Upper Stages (AUS)</li> </ol>

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<sup>11</sup> Air Force Space Command, “1998 AFSPC Strategic Master Plan (SMP),” PowerPoint briefing, slides 14-16.

<sup>12</sup> It can be argued that the Space Maneuver Vehicle and Space Operations Vehicle could be used for power projection, but the list does not include a weapons system for these vehicles; therefore, I concluded that the vehicle would be principally for force enhancement.

Source: Air Force Space Command, “1998 AFSPC Strategic Master Plan (SMP).”  
Powerpoint Briefing. 20

March 1999; Slides 29 & 30. From AFSPC Strategic Master Plan cd-rom.

According to the 1998 AFSPC Strategic Master Plan, approved by General Myers in March 1999, the space superiority mission area is at best the number two priority for Air Force Space Command as far out as 2025.<sup>13</sup> The top near term priorities are “improving battlespace situational awareness” (in the terrestrial battlespace) and “integrating aerospace forces.” Reviewing the prioritized list of near-term programs, (ignoring ICBM sustainment at number 2) it is not until you get to item nine that AFSPC lists anything associated with space power projection. The number nine near-term priority is “space surveillance upgrades.” The long-term priority list does improve the status of space power projection capabilities, with space-based laser (SBL) at number 3,<sup>14</sup> but the projects listed both above and below SBL principally support terrestrial warfighting missions (see Table 1).

One may not state unequivocally, however, that General Myers neglected space control. He included space control in a number of speeches while he was commander of AFSPC. He clearly demonstrated his understanding of the need to protect our national space interests. In an article written for Aviation Week & Space Technology, now Vice Chairman of the Joint Chiefs General Myers states:

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<sup>13</sup> Air Force Space Command, “1998 AFSPC Strategic Master Plan (SMP),” PowerPoint briefing, slides 14-16.

<sup>14</sup> It can be argued that the Space Maneuver Vehicle and Space Operations Vehicle could be used for power projection, but the list does not include a weapons system for these vehicles; therefore, I concluded that the vehicle would be principally for force enhancement.

The American military is built to dominate all phases and mediums of combat. We don't assume air, land or sea superiority but instead plan for, execute and seize the initiative. On the other hand, space superiority is assumed. We must acknowledge that our way of war requires superiority in all mediums of conflict, including space. Thus, we must plan for and execute to win space superiority.

The need is even greater as we rely more heavily upon space for forward presence, reach-back, indications and warning and missile defense. Our adversaries clearly understand the force-multiplication power space provides and may use asymmetric methods to deny us access.<sup>15</sup>

Clearly General Myers understands that space is a medium that needs to be protected and defended. The issue is a matter of priority. The question is should the priority of the commander of the only military space force be space support to the warfighter or defense of our national space interests? Table 2 includes a list of organizations within the Department of Defense that support warfighting with space support. Only one organization has the mission to employ space power projection, US Space Command. As the principal force provider for US Space Command, it would seem that the best the top priority for Air Force Space Command would be one that addresses the unique military mission of space – space control – rather than a mission shared by at least ten organizations – space support.

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<sup>15</sup> Richard Myers, "Space Superiority is Fleeting," an article written for Aviation Week & Space Technology, available at: <http://www.peterson.af.mil/usspace/avweek-gen%20myers.htm>, accessed 25 March 2000.

**Table 2. DOD Space Agencies**

DOD Agencies Involved in Space
US Space Command
Army, Navy, Marine Corps and Air Force
National Reconnaissance Office
National Security Agency
National Imagery and Mapping Agency
Defense Advanced Research Projects Agency
Defense Information Systems Agency
Ballistic Missile Defense Organization

Source: Frank Klotz, *Space, Commerce and National Security* (New York: Council on Foreign Relations Press, 1998).

Even the newest commander of Air Force Space Command places the priority of space support over space control. During his confirmation hearing, General Ralph Eberhart was asked what he believed was the greatest challenge faced by his command. He responded:

Sir, I believe, if confirmed, the biggest challenge of U.S. Space Command is the total integration of space capabilities to support the war fighter. As General Myers said earlier, as we look at our ability to support the war fighter in terms of missile warning, in terms of providing communication, navigation, targeting, information. Ensuring that that information is shared properly, is shared quickly, so that the war fighters or the national

decision-makers can use it appropriately. I think that will continue to be the largest challenge of U.S. Space Command.<sup>16</sup>

As the commander-in-chief of a unified command, USCINCSpace is a warfighter. Who is supporting him? Which military service has the mission to ensure space capabilities are developed to secure US space interests? It should be the Air Force. OSD cannot decide. Congress wants it done. Is there room for space in aerospace?

Since his confirmation hearing, General Eberhart has shown some promise as a space visionary. He recognizes the growing importance of space in the US Defense lexicon. However, he still should not be labeled a *Global Engagement*-class visionary. According to an *Air Force Magazine* article published in February 1999, General Eberhart believes the:

USAF is an “aerospace” force--a term used by the Air Force since the 1950s. Space will clearly become a larger and larger part of that equation in the years ahead, as Eberhart sees it, though, that does not mean that “air” will become less important than “space.”

Moreover, Eberhart told the AFA audience, the Air Force has to be careful to not just think about applying and exploiting space solely through Air Force systems and units. “We should view space through the joint warfighters' eyes,” he said. “[That is how] warfighters will benefit from what we are doing. ... We ought not [to] view it as a zero sum game. We ought to view it as getting better as an aerospace team,” said Eberhart.<sup>17</sup>

Speaking as the Assistant Vice Chief of Staff of the Air Force, General Eberhart recognized the importance of thinking jointly about space; however, his last comment about getting better as an “aerospace team” may have been better stated as “joint team” given the context of his prior statement. His statement supports the adage “where you sit is where you stand,” meaning that, in a bureaucracy, sometimes what you believe in is

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<sup>16</sup> Senate Armed Services Committee, “The Senate Armed Services Committee Holds a Hearing on Confirmation of Four Military Appointments,” FDCH Transcripts, 27 October 1999, 17.

<sup>17</sup> Peter Grier, “Partners in Space,” *Air Force Magazine*, vol. 82, no. 2 (Feb 99), available at: <http://www.afa.org/magazine/0299partners.html>, accessed 25 March 2000.

influenced by, and changes with, what job you holds. That aside, what is left unanswered by his statement is how space will become a “larger part of the equation” and why space will not or cannot become more important than air.

Statements such as those made by General Eberhart demonstrate a commonly held position among Air Force leaders that space power potential somehow lacks the right stuff. Despite this position, others in the Air Force have and do still believe that space power has great untapped potential be a decisive force.

Accordingly, the Air Force’s vision of its own future potential, especially with regard to space, has been largely inconsistent even since the development of *Global Engagement* in 1996. In addition, the vision’s latest incarnation, the aerospace concept, has some fundamental flaws when viewed from a larger military or national instrument of power perspective. First, it views space principally from an air perspective force-multiplier. Just as the army viewed the air service as support adjunct to the ground campaign, the Air Force views space as a support adjunct to the air campaign. This perspective upsets the community of space enthusiasts within and without the Air Force. The second flaw in aerospace is its definitional heritage. The other services are concerned that it infringes upon their mission areas. In addition it suffers from the semantic fog described by Lt. Col. Lupton. Space is clearly two media – why does the Air Force insist that it is only one? Thus, the reason so many people inside and outside the Air Force resist the aerospace vision may be because it is vaguely defined and fails to recognize the potential of space power.

## **Support for the Vision – Assessing External Buy-in**

As noted in Chapter 2, the lack of support for the aerospace concept manifests itself in a variety of forms:

1. According to a *Space Business News* article published 15 March 2000,

The Senate Armed Services Committee chastised the Air Force and the Department of Defense for their limited view of space as an information medium rather than a power projection medium.

2. Senator Bob Smith described an aerospace vision that seeks only to

exploit space for information purposes as a “deficient concept.”

3. Despite the efforts of the Air Force to incorporate the term aerospace in

to the latest version of DOD space policy, OSD refused to use the term.

In addition, though it outlines space responsibilities for several organizations within the department, the policy does not recognize any special status for the Air Force with regard to space systems development.

In addition to these previously discussed indicators, the Congress, citing a deficiency in the 1999 budget submission of the Air Force, directed a \$7.5 million “plus-up” in the DoD budget for “space control technologies” intended for the Air Force.<sup>18</sup> Recognizing that other services can contribute to space control, OSD directed the Army to include a \$3 million dollar space control line in its 2000 budget submission.<sup>19</sup>

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<sup>18</sup> David Doryland, Electronic mail message, received 23 March 2000. Major Doryland is the Space Control Program Element Monitor on the Air Staff.

<sup>19</sup> Ibid.

Most recently, Senator Smith has commissioned a panel to investigate how space should be organized within the Department of Defense. The Smith Commission will be chaired by former Secretary of Defense David Rumsfeld and will include in retired flag officers from all of the services. Though all services are represented, the majority of the commission members are former Air Force.

These moves by Congress and OSD demonstrate two things. First, the Congress continues to be dissatisfied with the level of commitment of OSD and the Air Force with regard to space. Second, OSD is not satisfied that the Air Force is the best service to manage the space program in general and the space control mission in particular. This lack of confidence on the part of both Congress and OSD demonstrates a need for change if the Air Force expects to maintain its controlling interest in space within the Department of Defense.

Though “buy-in” is difficulty to measure in exact terms, the conclusion to be drawn from the indicators cited above is that the Air Force lacks external support for the aerospace concept. Congress finds the term aerospace wanting unless programs are developed to pursue space control in addition to space support. OSD, by refusing to incorporate the term aerospace in space policy, and by continuing to dilute the space control mission by offering it to other services, seems unsure that the Air Force is the right place to build space capabilities. Because the Air Force itself lacks a consistent and coherent vision for space, it continually finds itself defending diverse interests. The latest defense the Air Force will have to mount will be to fend off efforts by the Smith Commission to remove some or all of the space responsibilities from the Air Force. Both space control and space support are important to the Air Force, but airpower missions are

more important than spacepower. Therefore space support to the air mission is the Air Force's top space priority. This leaves spacepower and space support to other services unfunded or underfunded, and neither Congress nor OSD are encouraged by this approach.

Unless the Air Force can develop a more balanced approach to air and space power, they may not achieve an aerospace vision. The Navy's vision of naval aviation and the Marine's vision of amphibious warfare had external support. Even the Air Service had support for its vision of independence. The Air Force should consider how it achieved its independence, or more importantly how the Army lost its air service, as it moves to develop an aerospace concept.

### **Organizational Change**

Though a number of organizational changes have occurred since the development of *Global Engagement*, this paper highlights three in particular: the Aerospace Basic Course, the integration of Information Operations (specifically computer network defense and attack) and space mission areas, and the initiative to develop the space equivalent of the Air Corps Tactical School.

First, immediately following the release of the new vision document, General Fogelman discussed the need to develop a cultural identity within the Air Force:

The senior leadership is looking at how other organizations and institutions have addressed this [culture] issue. We looked around for best of breed – who has the best cultural identity as a force – and the Marines do that better than anybody else. So we asked, “What is it that gives them that identity?”

They have a basic course that they put all their officers through – their future leaders. We would like to see if we can develop such a course. I would hope to run the first prototype in summer 1998.<sup>20</sup>

The organizational change that occurred in response to General Fogelman's direction was the establishment of the Air and Space Basic Course – now Aerospace Basic Course – under the new Squadron Officer College at Maxwell Air Force Base, Alabama.

The Aerospace Basic Course (ABC) is an intensive 4-week course designed to inspire new Air Force officers, principally second lieutenants, to comprehend their roles as airmen. "Students develop an airman's perspective – what the airman brings to the joint fight. Students also learn how to fight and win through teamwork with other professional airmen."<sup>21</sup> Significantly, space is a major part of the ABC curriculum. Of the 151 academic hours, approximately 15 to 20 percent are space related.<sup>22</sup> Some blocks include more space-related material than others; however, the majority of the space material emphasizes support aspects of space – how to integrate space into the air campaign. In addition, though faculty members participate in the development of the school's curriculum, the curriculum development staff has no space officer representation. Finally, space operators as a whole is not well –represented on the ABC faculty. Of the approximately 40 faculty members, only 2 are space and missile officers and both space and missile officers have only missile experience.<sup>23</sup>

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<sup>20</sup> Eric Butterbaugh, "Back to the Future: How Global Engagement will Impact You," *Airman Magazine*, vol. XLI, no. 4 (Apr 97), 22-27, available at: <http://www.af.mil/news/airman/0497/global2.htm>, accessed 27 March 2000.

<sup>21</sup> Aerospace Basic Course Curriculum, Internet Home Page, available at: <http://www.au.af.mil/au/asbc/curricul.htm>, accessed 27 March 2000.

<sup>22</sup> Rick Rogers, Academic Instructor, Aerospace Basic Course, Interview, Maxwell AFB, Ala., 23 March 2000. Captain Rogers is one of two career Space and Missile Officers on the ABC Faculty.

<sup>23</sup> Ibid.

The ABC curriculum is impressive in its content. It teaches new officers the attributes of aerospace power. The faculty does a credible job teaching space despite its limited space representation. If the Air Force had a warfighting vision for space, its professional military education would reflect that vision. Since the Air Force lacks such a vision, it is difficult to fault ABC, or any other Air Force professional military education school, for teaching space from a support perspective.

The second organizational change that is influenced by the aerospace vision deals with how the Air Force will integrate information operations into its warfighting command structure. In 1999, USSPACECOM assumed control of the computer network defense mission. In 2000, they will assume similar control of the computer network attack mission. In the DOD structure, then, the joint space community now “owns” a major portion of the information warfare mission.

How did the Air Force respond to this change? At Corona South 2000, proposals for how to integrate information operations (IO) into the numbered air force structure were discussed. According to the “Decisions and Taskers” final briefing, an action was given to Air Combat Command to “flesh out” an option to put “AIA [Air Intelligence Agency] and IO units under 8<sup>th</sup> Air Force.”<sup>24</sup> This is inconsistent with the joint approach, since 8<sup>th</sup> Air Force has no organizational link to AFSPC. Even though AFSPC was listed as a coordinator on the action, it appears that the Air Force will pursue an option to put IO under “combat” command rather than “space” command. If this occurs, the Air Force will structure itself differently than the joint community and forego an opportunity for Air Force space to develop credibility as a warfighter by allowing the command to pursue

a “combat” mission. Not only does it appear that AFSPC lacks credibility as a warfighter in the minds of Air Force leaders, it appears equally so that Air Force leaders are bent on keeping it that way. While OSD and the Joint Staff are moving to give space a force application mission, the Air Force continues to maintain space as a support community.

The third organizational change is occurring within the space community. In December 1999, General Myers approved the Space Warfare Center’s (SWC) long-range plan to become the space equivalent of the Air Corps Tactical School. The rationale for the change is that no organization is developing comprehensive space warfare doctrine. This being the case, SWC will “fill the doctrinal void” because “soon spacepower will be a combat arm like airpower … it needs a cohesive doctrine.”<sup>25</sup> The briefing on the SWC’s transition forcefully describes the need to think of space from a warfighting perspective. However, it pays heed to the aerospace integration vision when it states that the doctrine the SWC develops “must facilitate aerospace integration and ensure synergy between space assets and air expeditionary forces.”<sup>26</sup> It is interesting that the SWC has chosen “ACTS” as its model for change. ACTS for the Air Force was a center for independent thinking (and thinking about independence). It was also established away from the Army’s mainstream educational centers, as is the Space Warfare Center. It will be interesting to see how far the institutional Air Force lets the space ACTS go in with its new mission. The Air Force Doctrine Center at Maxwell writes doctrine. What will be different about the space doctrine written in Colorado Springs?

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<sup>24</sup> United States Air Force, “Corona South 2000 Decision and Taskers (Final),” PowerPoint briefing, Feb 00, slide 12 of 45.

<sup>25</sup> Air Force Space Command, “Space Warfare Center Long-range Plan,” PowerPoint briefing, approved by General Myers, 30 December 1999, slides 9 & 13.

<sup>26</sup> Ibid., slide 9.

According to Samuel Huntington, “organizational structure both reflects and shapes an entity’s priorities: it can facilitate or inhibit innovation; it helps define the issues that come to top decision-makers; it is significant in determining who plays what roles in deciding what issues.”<sup>27</sup> The organizational changes within the Air Force reflect a conflict between those who believe space is support and those who believe space has warfighting potential.<sup>28</sup> Ultimately the leaders will decide which is the proper vision. ABC was initially commissioned to develop an airman’s culture – a culture that included air and space as separate but equal components.<sup>29</sup> What is being taught at ABC is an aerospace culture – a culture where space support is integral to the air campaign. The fact that the joint community has given space a near-term combat mission in computer network attack, yet the Air Force is pursuing its IO mission within Air Combat Command implies that space, as a warfighter, may have a credibility problem among the air-minded Air Force leadership. The SWC recognizes a void in space warfare doctrine within the Air Force. Its mission to pursue a warfighting doctrine for space appears to be an effort to overcome the credibility problem. It will be interesting to see how far they will be able to go before being reigned in by those with the aerospace mindset.

Organizational changes will continue to occur as the Air Force evolves into an aerospace force. The Air Force should consider these changes in terms of how each contributes to the aerospace concept. Is teaching space support the best approach to professional military education? The SWC doesn’t think so. They are developing an

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<sup>27</sup> Samuel Huntington, “Organization and Strategy,” in *Reorganizing America’s Defense: Leadership in War and Peace*, ed. Robert Art, Vincent Davis and Samuel Huntington (Washington, D.C.: Pergamon-Brassey, 1985), 230.

<sup>28</sup> Undoubtedly it is possible to believe both.

<sup>29</sup> This is supported by the fact that ABC was developed in the shadow of *Global Engagement*, and this vision included not only air and space as separate entities but space as potentially preeminent over air.

independent school to produce “right-minded” spacepower theorists. The Air Force should ask itself why its own PME is insufficient in the minds of the SWC. In doing so, it should look to its own history and ask how ACTS contributed to the integration of air and ground power? It did not. Therefore how will Space ACTS contribute to integrating air and space power?

### **Promotion Pathways**

Promotion statistics are sensitive issues within the Air Force, especially statistics below the flag officer level. Therefore, the analysis in this section is limited to leadership selection practices within Air Force Space Command and Air Combat Command (ACC). Two issues are of particular interest: whom each organization considers for squadron command; and which career fields are represented among the senior leadership of each command.

While these two factors do not tell the whole story with regard to promotion pathways, they do provide some indication of the level of warfighting credibility each organization perceives of the other. In a military sense, combat equals credibility. In the Air Force, combat potential and combat experience are the keys to leadership. In the absence of war, those who have prepared for combat will lead, if war occurs, those who have served in combat will lead.

Since ACC’s mission is combat, they have a greater need for warfighting expertise than other major commands. The level of space representation in other major commands is likely an indicator of their perceived need for general space expertise, while the level of space representation at ACC is an indicator the perceived level of warfighting acumen (in addition to general space knowledge) held by space operators.

The selection process for space squadron command known as Vigilant Eagle occurs annually – typically in the late summer. The message that solicits candidates for the selection board allows any senior rater to nominate personnel from any career field as long as they meet the rank and time on station requirements.<sup>30</sup> While anyone may compete, the command selects only the most qualified officers. However, several rated officers screen for command each year.

The command screening process for Air Combat Command does not allow non-rated officers to compete. This would seem appropriate, given that flight experience has long been a prerequisite for commanding a flying squadron. However, the most recent selection board screened commanders for unmanned aerial vehicles (UAV) in addition to manned platforms. This board allowed pilots, navigators and air battle managers to compete for command billets.<sup>31</sup>

Why not space operators? Space operations entails operating remote vehicles and collecting and disseminating data in support of air operations. It would seem that this type of experience is similar to, though not the same as, the experience of air battle managers. Is this an example of space operators' lack of warfighting credibility within ACC? Are space operators unworthy to command even the lowest echelon of forces (UAVs) within the elite ACC? While airmen compete well for command in space, space operators remain ineligible to compete for command within the air combat community.

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<sup>30</sup> Hq Air Force Personnel Center, Message 181350Z Jun 99, Subj: Vigilant Eagle (13SX), Space Operations Squadron Commander Selection Board. In 1999 pilots and navigators were ineligible to compete because of Air Force policy to maximize rated officer usage in rated officer billets. However, some navigators did screen for command. (I was a candidate for command so I saw the message, but I can't locate a copy of it at this time.)

<sup>31</sup> Hq Air Education and Training Command, message no DTG, Subj: Semiannual ACC Flying Squadron Commander Candidate/UAV Selection Board. Received via E-mail, 20 March 2000.

If the Air Force were truly integrated, it would seem appropriate that the level of representation of airmen within Space Command would be on par with the level of space representation at Combat Command. This is obviously not the case, and with space serving primarily a support mission today, it would be inappropriate for ACC to have a large space contingent among its senior leadership. Yet the Air Force is evolving, so the evolutionary progress is what is in question.

At AFSPC, five of the nine general officers serving as directorate chiefs or in command billets are career aviators. Three of these career aviators served in prior space billets, but in each case the billet was at the wing command or higher level.<sup>32</sup> At ACC, of the ten flag officers listed on their staff web page, only one is a space officer. This officer is not, however, a staff director, but the commander of the Aerospace Command and Control, Intelligence Surveillance and Reconnaissance Center.<sup>33</sup> Comparing the leadership experience of the two commands, it appears that, while air operators have credibility in the space business, space operators lack a similar level of credibility in the “combat” business.

This is not to say that airpower experience is bad for the space business. The flag officers chosen to fill space command billets are exceptional leaders and are highly regarded for their operational knowledge and experience. It does, however, beg the question when will space officers fill the majority of leadership billets within their own command? At the same time, what will it take for ACC to select more space officers to

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<sup>32</sup> This information is the result of an evaluation of the biographies of general officers filling leadership positions at Air Force Space Command. Not included in these numbers are the Individual Mobilization Assistant and the deputy director of operations who are career space officers. The raw data is available at: <http://www.spacecom.af.mil/hqafspc/index.htm>, accessed 27 March 2000.

<sup>33</sup> This information is the result of an evaluation of Air Combat Command leadership's biographical information available at: <http://www2.acc.af.mil/library/biography/>, accessed 27 March 2000.

fill leadership positions in the combat arena? With non-space officers competing for space squadron command, and space officers ineligible to compete for “combat” command, how will space officers develop credibility among the mainstream aerospace warriors? It would seem appropriate for Air Force Space Command to develop a warfighting vision and foster a warfighting mindset of its own.

Recognizing “right-minded” thinkers was the goal of promotion pathway changes in previous evolutionary examples. In the aerospace paradigm, who are these thinkers? The SWC appears to believe right-minded aerospace thinkers are spacepower enthusiasts. ACC appears to believe right-minded aerospace thinkers are airmen who understand how space capabilities contribute to the air campaign. USSPACECOM thinks they are people who understand how to exploit space capabilities to defend US space and information interests. Who does Air Force leadership believe the right-minded people are? A review of Developing Aerospace Leaders, a study team commissioned by the current Chief of Staff, indicates that right-minded people have “unquestioned competence in space/info and flying operations.”<sup>34</sup> This sounds good until one comes to understand that competence in flying operations means that the leader has attended flight training.<sup>35</sup> It appears that just as the Air Force has difficulty obtaining external buy-in for the aerospace concept, it will likewise have difficulty gaining internal support from anyone other than airmen.

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<sup>34</sup> Charles Link, “Developing Aerospace Leaders,” Powerpoint Briefing presented to the School of Advanced Airpower Studies, 25 April 2000, Slide 38.

<sup>35</sup> Ibid., slide 40. An aerospace leader is a master of aerospace power. In order to become a master of aerospace power, one must have command credibility in both air and space. Command opportunities are not available to space operators in the air community unless they have had flight training.

## **Conclusion**

Does the Air Force have a consistent, coherent or shared vision for its future evolution? The evidence presented in this chapter would suggest that the answer is an emphatic “no.” Does the latest incarnation of Air Force vision, the aerospace concept, have external support? Despite its near-term usage, aerospace has a storied legacy. Based on the unwillingness of OSD to incorporate the term into its space policy, and Congress’ concern over what the concept envisions for space, it would appear that the aerospace concept lacks external support. Internal to the Air Force, the level of buy-in is difficult to determine. The concept has both advocates and enemies. While few argue against the merits of integrating air and space to improve the efficacy of airpower, many, including this author, are concerned that if that is all there is to aerospace, the concept is not much of a vision – especially for space enthusiasts.

Organizational changes that have occurred since Global Engagement are cause for concern for the aerospace concept. ABC is teaching that space is principally a support mission. The Air Force, given the option to incorporate a warfighting mission into space command, is instead pursuing the option to give the mission to combat command. And the SWC, assessing a void in space warfare doctrine, is pursuing an Air Corps Tactical School approach. Because space may lack credibility as a warfighter in the mainstream Air Force, the SWC will take a non-mainstream approach to develop a credible warfighting doctrine for space.

Finally, promotion pathways support the assumption that space lacks credibility among air-minded leaders. Airmen can command space squadrons, but space officers can’t command air (or even UAV) squadrons. Airmen are well represented in senior

leadership positions at space command, while space officers are hardly visible among the leadership at combat command. Given a lack of warfighting experience and little hope of gaining any in the future, the space community's situation should not be expected to change. Lacking a credible warfighting role, how can space be integrated into an aerospace force as anything other than a support function? I would propose that integration cannot occur between two dissimilar components. The lesser component can be incorporated into the greater, but integration requires parity. If the situation has any hope of changing, the change will begin with a warfighting vision for space.

## **CHAPTER 5**

### **CONCLUSIONS AND RECOMMENDATIONS**

*Space power is as important to the nation as land, sea, and air power. Space forces support military operations by providing information lines of communication enabling information superiority, contributing to deterrence, increasing force effectiveness, and ensuring the freedom of space. (Emphasis added)*

William H. Cohen  
2000 Annual Report

#### **Introduction**

This paper has presented compelling evidence that the Air Force's aerospace concept, as it currently stands, lacks the buy-in necessary to be fully implemented as an Air Force vision. It is not inclusive enough for space enthusiasts, and it is not sufficiently defined for OSD or Congress. It is on the verge of creating mission conflict between institutional centers of doctrine and education at Maxwell and the visionary thinkers in Colorado Springs. Finally, it shows little progress in improving the warfighting capacity or credibility of space within the Air Force. As with any evolutionary change, what is needed within the Air Force is a vision for space that addresses these conflicts. What the Air Force needs is a workable vision for space.

## **What is a workable vision?**

A workable vision is one that can be supported by both space and airpower enthusiasts. It will have external support from OSD and the sister services. It may not be the ideal vision for any one of these groups, but it is one that will increase the credibility of the military space sector in the eyes of the warfighters.

The concept of a workable vision may be too idealistic for some. Some believe that space and air are too different, and the only solution is to divide the two forces into separate entities. The problem with separation, aside from the cost of establishing a separate infrastructure, is that separation does little for space's credibility in a community of warfighters. Space, with only a support mission focus, should not be a separate force, but rather a separate agency. In its current state, space must belong to a service with a credible role in national defense. Currently, that service is the Air Force. What the Air Force can and should do is provide top-cover for a fledgling space warfighting mission. United, air and space can do more than either one can accomplish individually.

The workable vision concept may not go far enough for others. A vision should be a bold statement of intent. Unfortunately, bold statements of future space missions have had short-term support but no long-term staying power. *New World Vistas* and *Spacecast 2020*, two of the most recent attempts to identify future space concepts, are taught as history lessons in Air Force professional military education. Though they embraced lofty spacepower concepts, neither came with an implementation plan. Even Air Force doctrine speaks in lofty terms about force application for space. According to AFDD 2-2:

The application of force would consist of attacks against terrestrial-based targets carried out by military weapon systems operating in space.

Currently, there are no force application assets operating in space, but technology and national policy could change so that force application missions could be performed from platforms operating in space.<sup>1</sup>

This vision of weapons in space is shared by many. Unfortunately the military cannot get past policy constraints on this subject. A workable vision would have to either take on the policy or work around it. It is the position of this paper that space-based weapons are not required to give AFSPC a force application capability or a credible warfighting mission. Counterspace operations can be conducted by attacking ground based targets or by attacking space-based (or link) targets from the ground. The future is uncertain – too uncertain to pursue incredibly novel concepts; therefore, the vision for space must sacrifice novelty for workability.

What is generally agreed upon is that the economic and military power of the United States is becoming increasingly dependent upon space. The US military and US businesses are heavily reliant upon the data collected from and transmitted through space. Modernization efforts increasingly look to space systems as the means to cut cost, improve efficiency, and enhance productivity and military effectiveness. These efforts will increase our dependence on space. This dependence will create vulnerability, and this vulnerability requires protection.

Protecting and defending our national space interests is a military mission.<sup>2</sup> It is a warfighting mission, and according to Air Force Basic Doctrine, "The overriding objective of any military force [including the space force] is to be prepared to conduct

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<sup>1</sup> United States Air Force, Air Force Doctrine Document 2-2, *Space Operations* (Washington, D.C.: Department of the Air Force, Aug 98), 11.

<sup>2</sup> For those who do not believe this vision goes far enough, think of it as an interim vision. Space needs to get its proverbial foot in the door, before they will have warfighting credibility. The information operations mission offers a warfighting opportunity, but it may not go to AFSPC. Space control is next logical first step.

combat operations in support of national political objectives.<sup>3</sup> It is a mission that should be owned entirely by the US military's premier space force – the Air Force. It should be the top priority of the Air Force's premier space command – Air Force Space Command.

### **A Vision for the Air Force in Space**

General Estes had the priority right. The top priority of Air Force Space Command should be to advocate policies and sponsor the development of capabilities to protect and defend our nation's interests in and through the medium of space. Space support to the warfighter should not be neglected or discarded. But if warfighters need space support, they should be the advocates for that support. In addition, as discussed in the previous chapter, at least ten organizations are peddling space support capabilities. These organizations are principally support agencies. It is the role of agencies to support. The role of the military is to deter and defend. In that light, the Air Force's first core competency is air and space superiority.<sup>4</sup> It follows that the mission area that should be the top priority for the Air Force's space command should be space superiority – not superior space support but superiority on par with air superiority. Space superiority should mean superior capabilities to conduct offensive and defensive counterspace operations. Without such capabilities, space superiority cannot achieve its part of “air and space” superiority as the “important first step in military operations.”<sup>5</sup>

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<sup>3</sup> United States Air Force, Air Force Doctrine Document 1, *Air Force Basic Doctrine* (Washington D.C.: Department of the Air Force, Sept. 97), 7.

<sup>4</sup> Though Global Engagement does not specifically state that the core competencies are in priority order, Air and Space Superiority is listed first.

<sup>5</sup> AFDD 1, 29.

Until recently, the AFSPC vision read, “Fully integrated aerospace systems capable of rapidly and decisively engaging forces worldwide.”<sup>6</sup> It was difficult to determine to which command this vision statement belonged. Recently, the command vision statement was changed to read, “A globally integrated aerospace force providing continuous deterrence and prompt engagement for America and its allies … through control and exploitation of space and information.”<sup>7</sup> While this statement is a major step in the right direction, it still does not explain how AFSPC will achieve the vision give the priorities in their Strategic Master Plan (Table 4-1).

What AFSPC must do is shift its priorities. AFSPC needs to place its warfighting mission ahead of space support. Putting space support first, before space warfare, is akin to the Air Force advocating *AirLand Battle* doctrine. Beginning in the 1970’s and moving into the 80’s, the Army sold the Air Force on the concept of air support to ground operations. While this greatly improved the Army’s scheme of maneuver, it did little for airpower’s independent strategic role in the joint campaign. Col John Warden’s book, *The Air Campaign: Planning for Combat*, published in the late 80’s, began a movement away from air support envisioned by the Army and toward a more independent role for airpower. Air support is too limiting a role for airpower. Similarly, space enthusiasts believe that space support is too limiting a role for space power. As the aerospace concept is developed, it must recognize a role for spacepower beyond support to the air campaign. Otherwise the term is too limiting. As it currently stands, from a vision perspective, aerospace does not explore the full potential of spacepower.

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<sup>6</sup> Air Force Space Command, “1998 AFSPC Strategic Master Plan (SMP),” PowerPoint briefing, 20 March 1999, slide 9.

<sup>7</sup> Mary Ann Roney, “Space Command’s Future Vision,” *Space Daily*, internet, available at: <http://www.spacer.com/spacecast/news/milspace-00g.html>, accessed 27 March 2000.

## **Conclusions**

Over the course of this paper, historical examples, recent speeches and current writings have been used to support the following conclusions:

1. Without a commonly agreed to definition of the term aerospace, the Air Force will not be successful in remaking itself as an aerospace force. The Air Force appears to have adopted an aerospace definition that views space in a supporting role. External support for this vision is lacking as the Congress is pressing for greater space control development. OSD has failed to incorporate the term into space policy and does not share the view that space is a single medium for operational purposes.
2. Any description of an aerospace force developed by the Air Force must be supported externally by the Department of Defense and Congress and would benefit from support of the other services and space enthusiasts within the Air Force. Lacking support, the Air Force will continue to be in a defensive posture. Resources will continue to be siphoned off to other services for development programs such as National Missile Defense and space control technologies. Internally, as the Air Force continues to overuse the term aerospace, space enthusiasts will begin to ask where is space? Many current air staff briefings use the term aerospace and yet do not discuss a role for space. Space enthusiasts are disenchanted with this approach.

3. In its pursuit of the aerospace concept, the Air Force continues to regard space as support. Until space has a credible warfighting mission, it will continue to be regarded as a support function and continue to lack credibility in the “combat” community. According to DAL, leadership within the aerospace force requires competence in both air and space operations. Unfortunately, space operators are not allowed to lead air operations organizations unless they have been through flight training – a rare phenomenon. Until the aerospace concept makes room for other forms of power-projection besides airpower, space operations will be a support element and will never lead the Aerospace Force. Under this construct, space may be *incorporated* into the Air Force, but it will never be *integrated* due to the inequality between the two components. The first step toward recognizing the warfighting potential of space operations is the development of space power projection capabilities – information operations may offer such a capability, but it appears that ACC not AFSPC will get that mission. Space command and space operators lack credibility as warfighters. Let’s hope they are not doomed to remain that way.

4. The target vision for the Air Force, if it truly wants to develop a space warfare culture, is to establish a warfighting vision for space. The aerospace concept neglects the potential decisiveness of space power envisioned by space enthusiasts. The Air Force therefore needs a

workable vision for space within the air force – a vision that avoids the pitfalls inherent in the aerospace concept.

A workable vision for the Air Force with regard to space emphasizes the unique military role of space forces – protecting and defending our nation's interest in space. The National Reconnaissance Office, the other services, as well as civil agencies share the space support mission. In addition, the launch mission is transitioning principally to a commercial market. The role of the military is not to operate things but rather to defend our nation's interest. The top priority for AFSPC, then, is to be an advocate for capabilities that protect and defend space capabilities and interests. Effort spent advocating “space support to the warfighter” detracts from AFSPC’s resources and potentially infringes on the roles of other organizations. Let the warfighters (from any service) advocate for their own space support needs. As the principal space system provider, AFSPC will inherit those responsibilities for warfighter support deemed appropriate by the Secretary of Defense and will avoid the Air Force’s expending effort needed to advocate capabilities in its prime mission area.

### **Recommendations**

In order to begin to develop a warfighting ethos, AFSPC should make space superiority mission areas and space control capabilities its top priority. Protecting our national space interest is vitally important and no other service or defense agency has the manpower and resources to do it. According to General Estes, “We’ve got to pay attention to protecting this huge investment that this nation and other nations are making

in space. If we don't do that ... we are going to find ourselves in a position where we find them at risk and are unable to respond to it.”<sup>8</sup> The general goes on to say:

The first step in protecting our satellites must be to improve our ability to see what's happening in space. We need to detect and monitor objects less than half the size of what we can see now. Our satellites need to be designed to survive collisions with the debris we can't see and maneuver out of the path of debris we can see. Today, the first indication we would get that a satellite has been damaged would be when it quits working. We need to build in sensors that can tell us if satellites have been damaged by solar flares, debris, or someone on Earth.<sup>9</sup>

Given this guidance, the space surveillance mission area should be the first one to be “fixed.” It must be upgraded from a surveillance capability to a space reconnaissance capability. The principal purpose of space surveillance today is traffic control – to keep objects from colliding. While this mission is important, the surveillance sensors must also be capable of, and routinely implemented to perform space reconnaissance – the characterization of specific objects, once surveyed, as either friend or foe, and the determination of the capabilities and vulnerabilities of those objects. This mission is performed today by the Combined Intelligence Center, but the collection systems used are not optimized for reconnaissance.<sup>10</sup> Until space-based threats are adequately characterized, it will be difficult to design systems to counter them.

The next step would be to develop, test, deploy, and exercise offensive and defensive counterspace capabilities. The Air Force must be the advocate for policy changes that allow more robust capabilities. To the extent policy allows, systems should

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<sup>8</sup> Otto Kreisher, “The Move into Space,” *Air Force Magazine*, vol. 82, no. 4 (Apr 99), 4, available at: <http://www.afa.org/magazine/0499space.html>, accessed 5 April 2000.

<sup>9</sup> Howell Estes III, "Protecting America's Investment in Space," an undated address available at: <http://131.15.144.52/usspace/protect.htm>, accessed 23 March 2000. Gen Estes authored this article at the invitation of Mission HOME (Harvesting Opportunity for Mother Earth), a national initiative to rekindle enthusiasm for U.S. space endeavors.

<sup>10</sup> This fact is based on personal experience as the chief of the space object identification section in the Combined Intelligence Center, USSPACECOM/J2F, from August 1995 to August 1997.

be deployed to achieve maximum flexibility and effectiveness to perform denial, degradation, destruction, disruption, and deception operations.

From a protection perspective, a major concern is our reliance on commercial assets and commercial industry's perception that the threat to their systems is minimal to non-existent. According to General Myers:

Industry seems comforted by a number of assumptions and perceptions. First, space is seen as a peaceful medium – an international sanctuary for generating revenue. Accordingly, industry sees no threats on the horizon. In other words, they see neither the capability, nor the intent to threaten their assets.

Industry's imperative is, of course, to exploit space for profit. Therefore, given the perceived lack of threat, they see no business case for protection. Indeed, industry assumes the multi-national aspect of space provides its own protection – a sort of virtual neutrality enhancing the financial bottom line.<sup>11</sup>

This is a dangerous perception for industry to maintain; however, it would be unusual for policy makers to direct a corporation to install protection mechanisms on their systems.

What the government could do in lieu of mandating these modifications, is to indemnify companies against loss due to hostile acts should they incorporate recommended protection mechanisms. The actual form of those mechanisms are beyond the scope of this paper; however, if commercial interests would incorporate protection systems, it would allow the military to better characterize and respond to hostile acts against our nation's space interests.

General Myers, in an upcoming article written after he left Air Force Space Command, described the essential functions for effective space control. Calling our

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<sup>11</sup> Richard Myers, "Implementing Our Vision of Space Control," address to the US Space Foundation, Colorado Springs, Colo., 7 Apr 99, available at: <http://www.peterson.af.mil/usspace/speech15.htm>, accessed 5 April 2000.

mission assurance capabilities “not robust,” he said that improvements in five key areas are needed to improve our counterspace capabilities:

First, critical systems should be able to survive attacks with minimal or no damage. We might harden them to physical and electro-magnetic attack and develop mobile ground segments to disperse as needed.

Second, all our systems must be able to detect and report when they’re under attack. We need to quickly discriminate between system malfunctions and hostile acts.

Third, we must locate, classify and identify attacking systems. Such detailed information provides considerable deterrence value while allowing us to counter these threats.

Fourth, we need the ability to assess the impact of an attack, whether it results in permanent damage or temporary denial of service. Knowing what the adversary has done to our capabilities is critical to choosing effective responses.

Finally, we need the ability to rapidly restore space capability if successfully negated. This may include using redundant capabilities and rapidly replenishing damaged assets.<sup>12</sup>

Defending and protecting our nation's interests in space is not a new idea. But making the mission our top priority is an idea whose time has come. By developing a warfighting vision, and capabilities to implement that vision, it will be easier to integrate the space community with the rest of the Air Force. The difference between today's space and air capabilities is too great for equitable integration to occur. The Air Force already owns most of space. It is therefore, by definition, included in the Air Force structure. If the Air Force hopes to move beyond the “incorporation” of space systems that has been ongoing since the 1950's, it must adapt a new mindset towards space forces. In order for space to have equity, if not equality, within the Air Force, it must have a credible combat role. The Air Force needs a vision for space that includes this

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<sup>12</sup> Richard Myers, “Space Superiority is Fleeting,” article written for Aviation Week & Space Technology, available at: <http://www.peterson.af.mil/usspace/avweek-gen%20myers.htm>, accessed 25 March 2000.

combat role. Until such a vision is developed and pursued, the aerospace concept will only mean the integration of space capabilities to improve the effectiveness of the airpower mission and there will be no room for space warfighting within the aerospace concept.

## Bibliography

### Books

- Anderson, Brian. *An Idiographic Study of the Relationship Between Organizational Structure and a Successful Implementation of Advanced Manufacturing Technologies in Those Companies Exhibiting Best Practices*. PhD. Diss.. University of Alabama, 1998.
- Builder, Carl. *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the US Air Force*. New Brunswick, N.J.: Transaction Publishers, 1994.
- Cohen, William. *Annual Report to the President and the Congress, 2000*. Washington, D.C.: Office of the Secretary of Defense, 2000.
- DeBlois, Bruce M. “Ascendant Realms: Characteristics of Airpower and Space Power.” In *The Paths of Heaven*. Edited by Phillip Meilinger. Maxwell AFB, Ala.: Air University Press, 1997.
- Department of Defense. *Department of Defense Space Policy*. Washington, D.C.: Department of Defense, July 1999.
- \_\_\_\_\_. *The United States Strategic Bombing Survey*. Maxwell AFB, Ala.: Air University Press, October 1987.
- Estes, Howell, III. “The Aerospace Force of Today and Tomorrow: Transforming Our Service to Control the Vertical Dimension,” *Spacepower for a New Millennium: Space and US National Security*. Edited by Peter Hays. Unpublished Draft, 20 Jul 98.
- Griffin, H. Dwight, Richard McFarland, Debra Molloy, Richard Muller, Robert Pecoraro, Jan Rosko. *Air Corps Tactical School: The Untold Story*. Maxwell AFB, Ala.: Air Command and Staff College, May 1995.
- Hays, Peter. *Struggling Towards Space Doctrine: US Military Plans, Programs, and Perspectives During the Cold War*. Ph.D. diss.. Fletcher School of Law and Diplomacy, Tufts University, 1994.
- Hone, Thomas. “Navy Air Leadership: Rear Admiral William A. Moffett as Chief of the Bureau of Aeronautics.” In *Air Leadership: Proceedings of a Conference at Bolling Air Force Base, April 12-14 1984*. Edited by Wayne Thompson. Washington, D.C.: Office of Air Force History, 1986.
- Huntington, Samuel. “Organization and Strategy.” In *Reorganizing America’s Defense: Leadership in War and Peace*. Edited by Robert Art, Vincent Davis and Samuel Huntington. Washington, D.C.: Pergamon-Bassey, 1985.
- Jelonek, Mark. *Toward an Air and Space Force: Naval Aviation and the Implications for Space Power*. Maxwell AFB, Ala.: Air University Press, 1999.

- The Joint Staff. Joint Publication 1-02, *DOD Dictionary*. As Amended by JMGTM-085-97. Washington, D.C.: Joint Chiefs of Staff, March 1994.
- \_\_\_\_\_. Joint Publication 3-14, *Joint Doctrine, Tactics, Techniques, and Procedures (TTP) for Space Operations*. (Draft) Washington, D.C.: Joint Chiefs of Staff, 1998.
- Kennett, Lee. *The First Air War 1914-1918*. New York: The Free Press, 1991.
- Khong, Yuen Foong. *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of 1965*. Princeton: Princeton University Press, 1992.
- Klotz, Frank. *Space, Commerce and National Security*. New York: Council on Foreign Relations Press, 1998.
- Lupton, David. *On Space Warfare*. Maxwell AFB, Ala.: Air University Press, 1988.
- MacIsaac, David. "The Voices from the Central Blue: The Air Power Theorists." In *Makers of Modern Strategy: from Machiavelli to the Nuclear Age*. Edited by Peter Paret. Princeton: Princeton University Press, 1986.
- Mitchell, William. *Winged Defense: The Development and Possibilities of Modern Air Power Economic and Military*. New York: Dover Publications, 1988.
- Murray, Williamson and Allan Millet. *Military Innovation in the Interwar Period*. Cambridge: Cambridge University Press, 1996.
- Oberg, Jim. *Space Power Theory*. Colorado Springs: USAF Academy, 1999.
- Puryear, Edgar, Jr.. *Stars in Flight: A Study in Air Force Character and Leadership*. Novato, Ca.: Presidio Press, 1981.
- Reynolds, Clark. "William A. Moffett: Steward of the Air Revolution." In *Admirals of the New Steel Navy: Makers of Naval Tradition 1880-1930*. Edited by James Bradford. Annapolis: Naval Institute Press, 1990.
- Rosen, Stephen. *Winning the Next War: Innovation and the Modern Military*. Ithaca, N.Y.: Cornell University Press, 1991.
- Sherry, Michael. *The Rise of American Airpower: The Creation of Armageddon*. New Haven, Conn.: Yale University Press, 1987.
- Spires, David. *Beyond Horizons: A Half Century of Air Force Space Leadership*. Revised Edition. Maxwell AFB, Ala.: Air University Press, 1998.
- United States Air Force. Air Force Doctrine Document 1, *Air Force Basic Doctrine*. Maxwell Air Force Base, Ala.: Department of the Air Force. September 1997.
- \_\_\_\_\_. Air Force Doctrine Document 2-2, *Space Operations*. Maxwell Air Force Base, Ala.: Department of the Air Force. August 1998.
- \_\_\_\_\_. Air Force Manual 1-1, *Basic Aerospace Doctrine of the United States Air Force*, Vol. 1. Washington, D.C.: Department of the Air Force, 1992.
- \_\_\_\_\_. *Global Engagement: A Vision for the 21<sup>st</sup> Century Air Force*. Washington, D.C.: Department of the Air Force, November 1996.

- United States Marine Corps. *Fleet Marine Forces Manual 1-0, Leading Marines*. Washington, D.C.: Department of the Navy. January 1995.
- United States Space Command. *Long Range Plan*. Colorado Springs: United States Space Command, 1997.
- The White House, *A National Security Strategy For A New Century*. Washington, D.C.: The White House, December 1999.
- Warden, John. *The Air Campaign: Planning for Combat*. Washington, D.C.: Pergamon-Brassey, 1989.

## Periodicals

- Butterbaugh, Eric. "Back to the Future: How Global Engagement will Impact You." *Airman Magazine*, vol. XLI, no. 4 (April 1997): 22-27. Internet. Available from <http://www.af.mil/news/airman/0497/global2.htm>, accessed 27 March 2000.
- Cebrowski, Arthur and John Garstka. "Network-Centric Warfare: Its Origins and Future." *U.S. Naval Institute Proceedings*, vol. 24, no. 1 (January 1998): 28-35. Internet. Available from <http://www.usni.org/Proceedings/Articles98/PROcebrowski.htm>, accessed 17 February 2000.
- "Congress Tells DoD to Stop Dragging Its Feet: Space Initiative Projects Must be Focused." *Space Business News*, vol. 18, no. 6 (15 March 2000): 8.
- Day, Dwayne. "Listening from Above: The First Signals Intelligence Satellite." *Spaceflight*, vol. 41 (August 1999): 338-346.
- Estes, Howell, III. "Protecting America's Investment in Space." Unpublished Article. Mission HOME (Harvesting Opportunity for Mother Earth), undated. Internet. Available from <http://131.15.144.52/usspace/protect.htm>, accessed 23 March 2000.
- "Facing Up to Space." *Air Force Magazine*, vol. 78, no. 1 (January 1995): 50-54.
- Grier, Peter. "Partners in Space." *Air Force Magazine*, vol. 82, no. 2 (February 1999): 28-32. Internet. Available from <http://www.afa.org/magazine/0299partners.html>, accessed 25 March 2000.
- Jennings, Frank. "Doctrinal Conflict Over the Word Aerospace." *Airpower Journal*, vol. IV, no. 3 (Fall 1990): 46-58.
- Kreisher, Otto. "The Move into Space." *Air Force Magazine*, vol. 82, no. 4 (April 1999): 75-77. Internet. Available from <http://www.afa.org/magazine/0499space.html>, accessed 5 April 2000.
- Lupton, David. "Space Doctrines." *Strategic Review*, vol. XI, no. 4 (Fall 1983): 36-47.
- Myers, Kenneth and John Tockston. "Real Tenets of Military Space Doctrine." *Airpower Journal*, vol. II, no. 4 (Winter 1988): 54-68.
- Myers, Richard. "Space Superiority is Fleeting." Unpublished Article for *Aviation Week and Space Technology*. Internet. Available at <http://www.peterson.af.mil/usspace/avweek-gen%20myers.htm>, accessed 25 March 2000.

Roney, Mary Ann. "Space Command's Future Vision." *Space Daily*. Internet. Available from <http://www.spacer.com/spacecast/news/milspace-00g.html>, accessed 27 March 2000.

Smith, Bob. "The Challenge of Space Power." *Airpower Journal*, vol. XII, no. 1 (Spring 1999): 32-39.

## Speeches

Estes, Howell, III. "US National Security Space Programs and Policies and the DoD Budget Request for FY 1999 and Future Years Defense Program." Address. Testimony before the Senate Armed Services Committee Strategic Forces Subcommittee, Washington, D.C., 11 March 1998.. Internet. Available from <http://www.spacecom.af.mil/usspace/testim98.htm>, accessed 23 March 2000.

Fogleman, Ronald. "Global Engagement." Address. Smithsonian Institute's Air and Space Museum, Washington, D.C., 21 November 1996. Available from [http://www.af.mil/news/Nov1996/n19961122\\_961185.html](http://www.af.mil/news/Nov1996/n19961122_961185.html), accessed 20 March 2000.

Myers, Richard. "Implementing Our Vision of Space Control." Address. US Space Foundation, Colorado Springs, Colo., 7 April 1999. Internet. Available from <http://www.peterson.af.mil/usspace/speech15.htm>, accessed 5 April 2000.

\_\_\_\_\_. "Integrating Space in an Uncertain Era." Address. Air Force Association, Los Angeles, Ca., 13 November 1998. Internet. Available from <http://www.peterson.af.mil/usspace/speech11.htm>, accessed 5 April 2000.

Peters, F. Whitten. "The State of the Air Force and its Future." Address. South Bay Chamber of Commerce, Los Angeles, Ca., 20 January 2000. Internet. Available from <http://www.af.mil/news/speech/current/spch01.html>, accessed 15 February 2000.

Ryan, Michael. "Beyond the Horizon: Realizing America's Aerospace Force." Address. Annual Space Convention, Air Force Association. Los Angeles, Ca., 19 November 1999. Available from <http://www.af.mil/news/speech/current/sph27.html>, accessed 15 Feb 00.

Widnall, Sheila. "Adapting to an Altered Strategic Environment." Address. Center for Strategic and International Studies, Washington, D.C., 25 November 1996. Internet. Available from [http://www.af.mil/news/speech/current/Adapting\\_To\\_An\\_Altered\\_Stra.html](http://www.af.mil/news/speech/current/Adapting_To_An_Altered_Stra.html), accessed 20 March 2000.

\_\_\_\_\_. "Stewards of Space." Address. Space Transportation Organization, Washington, D.C., 8 May 1996. Internet. Available from <http://www.fas.org/spp/military/docops/usaf/di1150.htm>, accessed 17 February 2000.

## Briefings

Air Force Space Command. "1998 AFSPC Strategic Master Plan (SMP)." PowerPoint Briefing. 20 March 1999. Available on CD-ROM.

\_\_\_\_\_. "Space Warfare Center Long Range Plan." PowerPoint Briefing. 30 December 1999.

Johnson, Dana, Kenneth J. Reynolds, Katherine Poehlmann, Liam Sarsfield, Steven Sloboda, William Williams, Paul Steinberg, Donna Fossum, David Rumpel. *Integrating USAF Space*

- Operations: A Framework to Explore the Evolution of Air and Spacepower* – Annotated Briefing. (Doc. Num. AB-203-1-AF) Santa Monica: RAND Project Air Force. June 1998.
- Link, Charles. “Developing Aerospace Leaders.” PowerPoint Briefing presented to the School of Advanced Airpower Studies. 25 April 2000.
- United States Air Force. “Corona South 2000 Decision and Taskers (Final).” PowerPoint Briefing. February 2000.

## Interviews

- Morgan, Forrest. Lieutenant Colonel, USAF. Former Staff Officer Headquarters United States Air Force. Interview. Maxwell AFB, Ala., 31 January 2000
- Rogers, Rick. Captain, USAF. Academic Instructor, Aerospace Basic Course. Interview. Maxwell AFB, Ala., 23 March 2000.
- Wood, Brandon. Lieutenant Colonel, USAF. Vice Commandant, Aerospace Basic Course. Interview. Maxwell AFB, Ala., 23 March 2000.

## Other

- Air Education and Training Command. Message Date Time Group Unavailable, Subject: Semiannual ACC Flying Squadron Commander Candidate/UAV Selection Board. Received via Electronic Mail, 20 March 2000.
- Air Force Personnel Center. Message Date Time Group 181350Z Jun 99, Subject: Vigilant Eagle (13SX) Space Operations Squadron Commander Selection Board.
- Cohen, William. *Department of Defense Space Policy*. Washington, D.C.: Office of the Secretary of Defense, July 1999.
- Doryland, David. Major, USAF. Space Control Program Element Monitor, Headquaters United States Air Force. Electronic mail message received 23 March 2000.
- Home Page. “Aerospace Basic Course Curriculum.” Internet. Available from <http://www.au.af.mil/au/asbc/curricul.htm>, accessed 27 March 2000.
- Home Page. Headquarters Air Combat Command. Internet. Available from <http://www2.acc.af.mil/library/biography/>, accessed 27 March 2000.
- Home Page. Headquarters Air Force Space Command. Internet. Available from <http://www.spacecom.af.mil/hqafspc/index.htm>, accessed 27 March 2000.
- Johnson, Dana, Scott Pace, C.B. Gabbard. *Space: Emerging Options for National Power*. (Doc. Num. MR-517) Santa Monica: RAND, 1998.
- Johnson, Dana, Katherine Poehlmann, and Richard Buenneke. *Space Roles, Missions, and Functions: The Challenge of Organizational Reform*. (Doc. Num. PM-382-CRMAF) Santa Monica: RAND National Defense Research Institute, August 1995.

Moffett, William, Chief, Bureau of Aeronautics. To Rear Admiral William Sims, President, Naval War College. Letter, Subject: Naval Aviation. Sims Papers, Box 74. Newport, R.I., 31 October 1921

Rothstein, Stephen. *Dead on Arrival?: The Development of the Aerospace Concept, 1944-1958.* Masters Thesis. Air University: School of Advanced Airpower Studies, June 1999.

Senate Armed Services Committee. "The Senate Armed Services Committee Holds a Hearing on Confirmation of Four Military Appointments." Washington, D.C.: FDCH Transcripts, 27 October 1999.